



Future Publishing Limited

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www.digitalcameraworld.com

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Printed in the UK by William Gibbons on behalf of

Future. Distributed in the UK by Seymour

Distribution Ltd, 2 East Poultry Avenue, London

EC1A 9PT. +44 (0)20 7429 4000



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CAMERA BAG ESSENTIALS

Welcome to *Camera Bag Essentials*, the compact photography reference no photographer should leave home without! Over five chapters, our experts explain key camera techniques and concepts in quick, easy-to-follow guides. Learn how to take better pictures by understanding how your camera works, discover what essential equipment you need to take stunning photos, and follow step-by-step guides to capture almost anything you would want to photograph.

The book is designed to slot into your camera bag or a large pocket, and the contents are designed to be easy to find and easy to digest, so whether you're still learning photography, or you're an old hand that needs a quick reminder about this or that key setting or technique, you'll find *Camera Bag Essentials* indispensable!

Chris

Chris George, Series editor

Contents



6 Essential accessories

- 8 Top 10 accessories
- 10 Digital SLR
- 12 Additional lenses
- 14 Filters
- 15 Colour target
- 16 Tripod & remote
- 18 Flashgun
- 20 Reflector
- 22 Spare battery
- 23 Memory cards

24 Quick reference

- 26 Exposure
- 29 Shooting modes
- 30 Aperture
- 34 Shutter speed
- 38 ISO sensitivity
- 40 Metering
- 42 The histogram
- 44 The viewfinder
- 45 Angle of view
- 46 White balance
- 47 The colour wheel
- 48 Autofocus
- 50 Hyperfocal focusing
- 51 Digital processing
- 52 Studio photography

56 Creative projects

- 58 Dramatic landscape
- 59 Long exposure
- 60 Abstract landscape
- 61 Light trails in the city
- 62 Spring flowers
- 63 Fruit splash!
- 64 Environmental portrait
- 65 Natural child portrait
- 66 Extreme macro still life
- 67 Speeding car
- 68 Solarised still life
- 69 Polarised still life
- 70 High-key flowers
- 71 Frozen leaf
- 72 Colour burst!
- 73 Water drops
- 74 Street candid
- 75 Abstract cityscape
- 76 Family portrait grid
- 77 Abstract architecture
- 78 Forest at dawn
- 79 Woodland montage
- 80 Wild deer
- 81 Worm's eye view
- 82 Garden birds
- 83 Interior architecture
- 84 Extreme close-up
- 85 Colour grid
- 86 Point of view
- 87 Milky seascape
- 88 Mono landscape
- 89 Dewdrop macro
- 90 Landscape silhouette
- 91 Film-noir portrait
- 92 Abstract art
- 93 Monochrome plant art
- 94 Firework display
- 95 Star trails
- 96 Classic moon shot
- 97 Torch spirograph
- 98 Toy train
- 99 Focus stacked macro
- 100 Flash portrait
- 101 Surf action

102 Field guides

- 104 Metering
- 108 Focusing
- 112 Sharpness
- 116 Filters
- 120 Landscapes
- 130 Wildlife
- 134 Portraits
- 138 Architecture
- 142 Birds
- 146 Macro
- 150 Low light
- 154 Weddings

158 The complete dictionary of photography



CHAPTER 1



Essential accessories

Discover which camera accessories you
really need, and how to use them



In this section

- 8 — Top 10 accessories
- 10 — Digital SLR
- 12 — Additional lenses
- 14 — Filters
- 15 — Colour target
- 16 — Tripod & remote
- 18 — Flashgun
- 20 — Reflector
- 22 — Spare battery
- 23 — Memory cards

TOP 10 essential accessories

Discover the ten camera accessories that will help you to take better shots

Many of the techniques in this book require the use of one or two key accessories that any serious photographer should have. A tripod is high-on essential if you want sharp pictures in almost any conditions or situation, for instance. The following 14 pages reveal our recommendations for the best photography add-ons you'll need to make the most of your images.

1

CAMERA BAG

If you've got a small camera and a single lens, a bag may not seem essential, but it's a good way to protect them in transport, and it keeps rain and dust at bay. And as you build up a collection of lenses and accessories, you'll find that you need something to keep it all together and make it easier to carry. Backpacks are a great way to carry heavy equipment over long distances or uneven terrain.

2

ADDITIONAL LENSES

The chances are that your camera came with a standard zoom lens, which covers a focal length range of around 18-55mm on an APS-C format camera. This is a great starting point, but it won't be long before you find you need something a bit wider for shooting landscapes or interiors, or you need a telephoto lens to allow you to frame action subjects tightly.

3

FILTERS

Landscape experts will often use a graduated filter to tone down a bright sky along with a polarising filter to intensify the colours. Polarising filters intensify blue skies, but they also subdue reflections and glare, so that leaves are greener. ND filters allow you to include movement blur in your shots.

4

COLOUR TARGET

If you're photographing, say, clothing for a catalogue, your colour reproduction has to be perfect or you'll have very unhappy customers returning goods. We not only show you how to use one of these, but provide one for you on the inside front cover of this book!

5

TRIPOD

A tripod is essential because it provides a method of holding your camera at exactly the right angle and keeping it absolutely still so your images are pin-sharp and full of detail. Don't be tempted to buy a cheap, flimsy tripod, though. You want something sturdy that will keep your camera still in a breeze and not wobble like a jelly every time you touch it or the camera.

6

REMOTE RELEASE

A remote release allows you to trip the shutter without

touching the camera, so it's useful for longer exposures when the camera is on a tripod because it avoids introducing unwanted wobble.

7

FLASHGUN

The pop-up flash on your camera is useful for adding a little fill-in light, but you'll get greater power and more flattering results from a flashgun. This can mount in the camera's hotshoe, or for better results, be fired remotely via a cable or wireless connection.

8

REFLECTOR

Use this to 'bounce' light into the shadowed side of your subject's face when you have just one light source. The silver cover gives a neutral light; gold adds warmth.

9

SPARE BATTERY

The power meters on digital cameras aren't very sensitive, so you never know exactly when you're about to run out. A spare battery can save you a lot of heartache, especially in cold weather, which drains batteries even faster.

10

MEMORY CARDS

Don't waste time fretting over image size and compression settings! It's much better simply to bite the bullet and invest in some bigger memory cards.



Digital SLR

Understand each of your digital SLR's dials, buttons and settings



1

LENS RELEASE

To remove the lens press this button and twist the lens in an anti-clockwise direction. Make sure you have the protective body cap or another lens to hand when performing this task, because you don't want to leave the sensor exposed to dust.

2

SHUTTER RELEASE

To capture a photograph, press the shutter release button on the top panel. To focus and meter the scene, half press the shutter release first.

3

LENS

The beauty of owning an SLR is that you can change the lens. This makes it far more versatile than a camera with a fixed lens because you can alter the angle of view.

4

SENSOR

The sensor is where your images are recorded, before being processed and then stored on your memory card. A mirror blocks the sensor and projects the scene up through the viewfinder. When you take a photograph, the

5

MODE DIAL

The mode dial is where you access the camera's shooting modes. Here you communicate with your SLR, telling it what you want it to control, and what you want to alter manually. For first-time users, the Fully Auto mode is appealing because it selects all the camera settings for you.

6

HOTSHOE

If you wish to attach an external flashgun, you can do so here. To attach a flashgun, slot it into place and secure it by tightening up the catch on the device.



7

COMMAND DIAL

The command dial is used to alter camera settings and to adjust features.

8

LCD SCREEN

The LCD screen has lots of uses, including displaying images while reviewing or composing, and showing shooting information. Some digital SLRs, such as the 700D, include a Vari-Angle LCD screen for creative framing.

9

BACK PANEL CONTROLS

The back panel multi-controller is the handy feature you use to alter settings and navigate through the menus. These buttons are also assigned to camera features. If you have a more advanced camera, you may have a mini joystick multi-controller.

10

VIEWFINDER

To compose an image, you look through the viewfinder on the back panel. Next to the viewfinder is the dioptre control, which you can tweak to adjust the screen inside your viewfinder to your vision.

11

MENU BUTTON

To access all the shooting, reviewing and other custom menu options, press the Menu button, then use the multi-controller and the OK button to navigate and select.

12

CONNECTION POINTS

To connect your camera to another device, such as a computer or a TV set, lift the rubber connection flap and insert the supplied cable into the correct port. You can also connect to a remote

shutter release here; handy if you want to take a photo without touching your camera.

13

FLASH

All of the beginner models of SLR and some in the enthusiast ranges include a built-in pop-up flash unit. Handy if you need to shine a bit of extra light on to your subject matter, but not as good as a proper flashgun. To activate it, you press the button marked with a lightning symbol. The built-in flash can also be used as a trigger for studio lights or external flashguns.

14

MEMORY CARD SLOT

On the other side of the camera is the memory card slot. Some SLRs include the memory card slot on the bottom of the camera in the battery compartment.

Additional lenses

The lens is the eye of your camera. We dissect one to show you what's inside

Lens aperture

This opening controls how much light is let in

Front element

The big piece of glass on the front collects the light – and is also the most exposed to dust and vulnerable to scratches

Zoom ring

When you turn the zoom ring, internal groups of lens elements move, changing the focal length



Vibration reduction (VR)

Image stabilisation technology uses gyroscopic sensors and a micro-computer to detect and compensate for lens vibrations caused by hand shake

Bayonet lens mount

This attaches the lens to your SLR. Contacts supply power from your camera to drive the autofocus and VR, and enable the camera and lens to communicate

Lens motor

Autofocus lenses have motors to move the elements. Silent Wave Motor (SWM) lenses are quiet and fast

Focal length

The focal length currently set is indicated by the number on the zoom ring that lines up with the central mark

A major benefit of a digital SLR is the availability of a variety of lenses suited to particular photographic situations. You may already know that 'long' lenses make distant subjects appear closer, or larger in the picture, while 'wide-angle' lenses take in more of the scene.

Specifying the focal length numerically makes it easier to compare different lenses.

Focal length is measured in millimetres. The range around 35-50mm is considered 'normal', or 'standard', because it roughly matches your field of vision. Wide-angle lenses have shorter focal lengths than this. Their wider view enables you to get more of a scene into your shot – good for big landscapes and tight spaces. Long (or 'telephoto') lenses –

70mm and upwards, say – excel at close-ups, portraits, and sports and wildlife photography.

Focal length is closely related to 'angle of view'. This directly describes how much or how little of the scene you can see in your SLR's viewfinder. The term 'wide-angle' is helpfully descriptive – these lenses have short focal lengths, such as 18mm. At the other end of the scale, we don't speak of 'narrow-angle' lenses, although it would be logical for long lenses such as 200mm.

However, to complicate things slightly, the angle of view in your viewfinder (and in the final picture) isn't solely determined by the focal length of the lens. This is because not all D-SLRs are alike – they have different-sized sensors. The sensor is the digital chip that captures

the image. In SLRs, it's one of two sizes. Most SLRs use smaller sensors (about 24x16mm), designated 'DX' or 'APS-C'. Pro models have larger 'FX', or 'full-frame', sensors (36x24mm). The larger sensor sees more of the image projected by the lens. This means that the same lens gives a wider angle of view on a full frame camera than on an APS-C model. In fact, focal length is effectively magnified by 1.5. We describe this as the 'crop factor'. With telephoto focal lengths, this brings you even closer to the action. For instance, it means that a 200mm lens has an effective focal length (EFL) of 300mm (200x1.5). This is often helpful for wildlife photography. Conversely, the crop factor reduces the 'wide-angle-ness' of wide-angle lenses. For example, an 18mm lens has an EFL of 27mm.



Maximum aperture key points

Not all lenses have constant, wide maximum apertures...

■ Lens aperture values follow a fixed sequence of values from f/16 to f/11 to f/8 and so on. Your SLR can also set intermediate values, which represent fractions of a stop.

■ Professional-quality lenses usually offer wider maximum apertures than cheaper 'consumer' lenses – even with lenses of the

same focal length. Professional zoom lenses also usually have constant maximum apertures throughout the zoom range. Obviously, they cost more too.

■ Cheaper 'consumer' zoom lenses will usually have a lower maximum aperture at full zoom than at the shortest length.



Filters

Filters come in different shapes and sizes, but which system is right for you and your lens collection?

Filters come in two varieties; round and square (or rectangular). Round filters screw into the filter thread on the front of a lens and need to be bought in a specific size, whereas square filters slide into a holder that mounts on the end of a lens. Round filters are quick and easy to use, but you need to buy them in the correct size for every lens you use. Square filters can be

transferred between lenses by using different sized adaptor rings, and are the only real choice when using graduated filters because the gradation needs to be located in exactly the right spot over the scene in the viewfinder.

Neutral density filters are popular because they enable you to take long exposure shots in daylight to blur cloud or water movement in landscapes. They also come in handy

when you want to shoot with a very wide aperture in bright light. Polarising filters are used to cut down on reflections and boost saturation and contrast. They are especially useful for landscape photography. ND grads, or graduated neutral density filters, block light in only part of the image, so you can shoot a landscape without overexposing the sky, for example.



Polariser

Saturates blues and greens, eliminates reflections



ND grad

Darkens the top or bottom part of an image



ND filter

Darkens the entire image, enabling long exposures



Colour target

Sometimes, accuracy is more important than going with personal preference. Here's how to use a colour target...

Certain colours are familiar to us either because we see them so often, like the colour of grass, or are important for cultural and psychological reasons, like skin tones.

Most of us are so attuned to what they ought to look like that we are highly sensitive to colours that are 'off'. Skin tones – and there are many subtle variations in even one face or one hand – probably top the list of what are called memory colours, and we don't need a spectrometer to see if they look right in a photograph, or in some way 'wrong'. When you judge colour balance in, say, raw processing, these are the colours to pay attention to, and none of them are highly saturated. This is why they occupy pride of place on the top row of a colour target (see the inside front cover of this book for your target). Setting the white or grey in a scene to neutral works for most purposes, but it's still a rough-and-ready approach, with the software simply 'dragging' other colours and tones in the same general direction of your adjustment. You can use the grey card we've provided inside the front cover for this purpose.

The top row of the colour target contains memory colours that include skin tones, blue sky, and foliage, the second medium-saturated colours, the third the three primaries and secondaries, and the bottom row a grey scale from white to black.

When getting all of the colours in a photo exactly right is the most important thing, such as if you're photographing a painting or doing a



commercial shoot where the product colours have to be spot-on, the way to go is to include a set of known colours in the shot – or rather, in one of the shots. This can then be used to correct any colour mismatches.

To use the target you have someone hold it up to the camera once you've got the lighting on the scene the way you're going to shoot it. You then shoot it, and process the image in DNG Profile Editor, free for Windows and Mac from www.adobe.com. Use the chart as follows, and remember, the profile you create is good for only that scene and its lighting:

01 Photograph the target large in the frame, face-on, and at an average exposure setting. Ideally, the white

patch should register around 245 on the 0-255 Levels scale, and the black patch around 50. **02** Open the image in your raw processor, do nothing to it, and save it as a DNG file. **03** Open DNG Profile Editor. **04** Click Chart, and open the image you just shot, dragging and centering the four colour circles on the four corners of the chart you photographed. **05** Choose either or both tungsten-balanced lighting or daylight-balanced depending on the lighting. **06** Click the Create Color Table button to create the colour profile. **07** Now export the profile from the File menu. **08** When you open any of the raw images shot during that session in ACR, choose your custom profile.

Tripod and remote release

A sturdy tripod helps you stay steady. Coupled with a remote release, your shots will be as sharp as possible

Remote release

Maintain camera stability by firing the shutter with a remote release unit

Tripods are all but essential when there's very little light, keeping the camera steady when the shutter speed is slow. But that's just the start of the benefits. Taking time to adjust the camera position very precisely can make a world of difference when it comes to good composition, for example. Tripods are also great for taking self-portraits; for time-lapse photography; and for using neutral density filters to enable long exposures. Further possibilities include keeping the camera locked in position for a series of exposures that you combine to create an HDR image, or for precision panning for capturing a sequence that will form the basis of a panorama. In short, they are essential for anyone serious about making great images.

You can save money on a tripod by buying a 'kit' that includes both legs and head in one package, but as you move up

the price range, any savings you get from buying a kit instead of separates will be negligible, even if kits are available. Buying separates also gives you the freedom to mix and match the legs and head, so you get the components you really want. Most current tripod designs have legs that can lock at varying angles to the centre column, which is useful for maintaining stability in low-level shooting. Some also have pivoting centre columns and twist locks for speed.

Tripod head

You can buy different types of tripod head for different types of shot. The ball design is the most convenient for everyday use

Bulb switch

Most releases feature a catch that will hold the shutter open as long as necessary, for use with your SLR's Bulb mode

You'll make the most of your tripod by using it with a remote shutter release. These devices enable you to fire the shutter without touching the camera, thereby avoiding camera shake. They cost just a few pounds, and come in wired and wireless versions.



Remote release in action

Three types of photo made easier by a remote shutter release and tripod



01 Landscape

For landscapes you need to use a narrow aperture such as $f/11$ to ensure that most of the scene is as sharp as possible. This will usually require a slow shutter speed. Using a remote reduces the chances of camera shake during the exposure.



02 Waterfalls

You'll need to use a slow shutter speed if you want to capture moving water as a blur, such as when shooting rapids or seascapes. Again, the remote reduces the chances of camera shake.



03 Light trails

Light trails usually require extremely long shutter speeds to render the light as desired. A remote release enables you to trigger and end the exposure without your having to touch the camera.

Flashgun

Where that intense burst of light comes from

Diffuser screen

A translucent plastic screen in front of the tube is designed to spread the light so that the coverage is as even as it can make it

Flash tube

A glass tube filled with xenon gas, which the high voltage charge passes through to create the flash. An electrical coil around the tube excites the gas particles to help the process

Reflector

A silvered surface ensures that as much light as possible is directed towards the subject

Capacitor

A reservoir of electrical charge. A transformer increases the voltage from the batteries to the 300 volts needed by the flash tube

There's a time and a place for flash. It will often kill the atmosphere at a party, but there are other times when it's the essential ingredient for a successful shot. The secret to success is to use the built-in flash on most SLRs with caution. The key to getting good results is often a matter of exposure, ensuring you use settings that make the flash look as natural as possible. Using flash complicates the usual problems of exposure. You not only have to choose the shutter speed, aperture and ISO to suit the scene, you have to add the flash power into the exposure equation too. A flashgun provides a brief burst of light – but the duration can be varied to alter how much flash 'power' is added to the scene. The amount of power needed will depend on the aperture used (the wider the f/stop setting, the less power required) and how far away they are. The power of the flash falls away with distance.

The maximum power varies – the built-in flash has much less power than add-on units – but once the subject is more than a few paces away, flash has little effect. If your subject is within range, you can leave the camera to set the flash exposure automatically, or switch the flash to manual mode (if available) and work it out for yourself using the camera's Guide Number. You take the distance to your subject and divide this into the Guide Number to get the lens aperture you need for the correct flash exposure.

The ISO setting is also a factor – the higher the sensor sensitivity, the less flash power is required. More power means you can shoot at greater distances, too. The shutter speed is often not a significant factor in the flash exposure calculation, although the shutter speed matters for other reasons. The 'focal plane' shutter of your camera works in a way that

means that you can't use the full shutter speed range – ordinary flash won't work with speeds faster than the maximum 'sync speed' for your camera. If you're using the built-in flash or a dedicated external flash, most of the factors that need to be considered when calculating flash exposure are handled by the camera. Inevitably, automatic flash will not always give the results that you want. It's possible to switch the flash to manual mode, then choose the power you need to suit the subject distance or the aperture setting. You can choose ½ power, ¼ power and so on – the power is adjusted in the same 'halving' and 'doubling' steps as regular exposure settings. Some of the time, though, it's best to leave the flash set to auto.

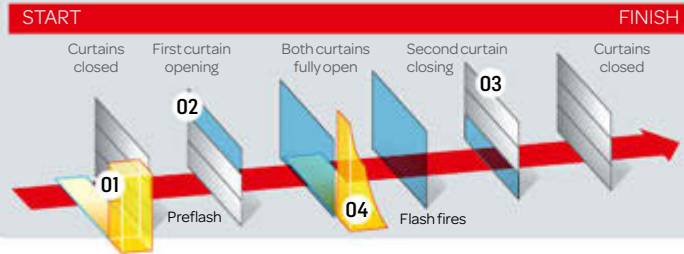


Split-second timing

The shutter speed and flash mode define the flash timing

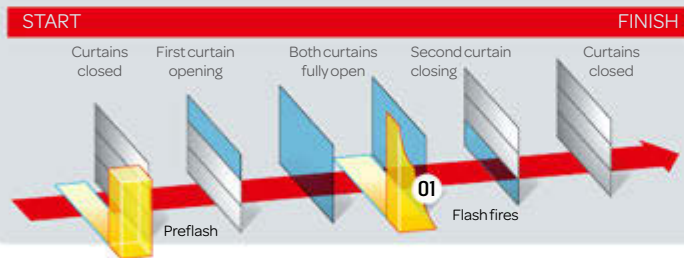
01 First curtain sync flash

The flash briefly pulses before the shutter fires (01) to set the flash exposure. The shutter is made up of two metallic 'curtains' (02 & 03). As soon as the first is open and the sensor is fully uncovered, the flash fires (04). At the end of the exposure the second curtain closes.



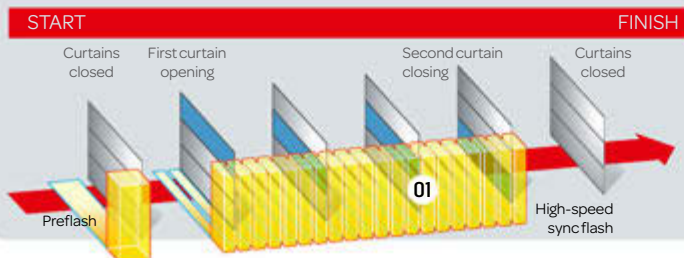
02 Second curtain sync flash

If the camera or flash is set to second-curtain sync, the flash will fire at the end of the exposure (01) where the shutter blinds are fully open – rather than at the beginning of this exposure. This is useful with moving subjects, and with slower-than-usual shutter speeds.



03 High-speed sync flash

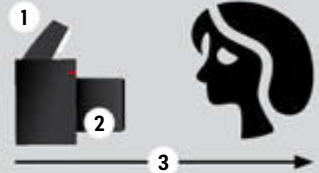
At shutter speeds above the SLR's normal 'sync speed', the shutter is never fully open and the exposure is therefore made by a moving slit, created by the two shutter curtains. In high-speed mode, the flash continually fires, or 'pulses', throughout the exposure (01).



Guide numbers explained

CAMERA

SUBJECT



1 Guide number
(see your manual) **2 Lens**
aperture **3 Distance**

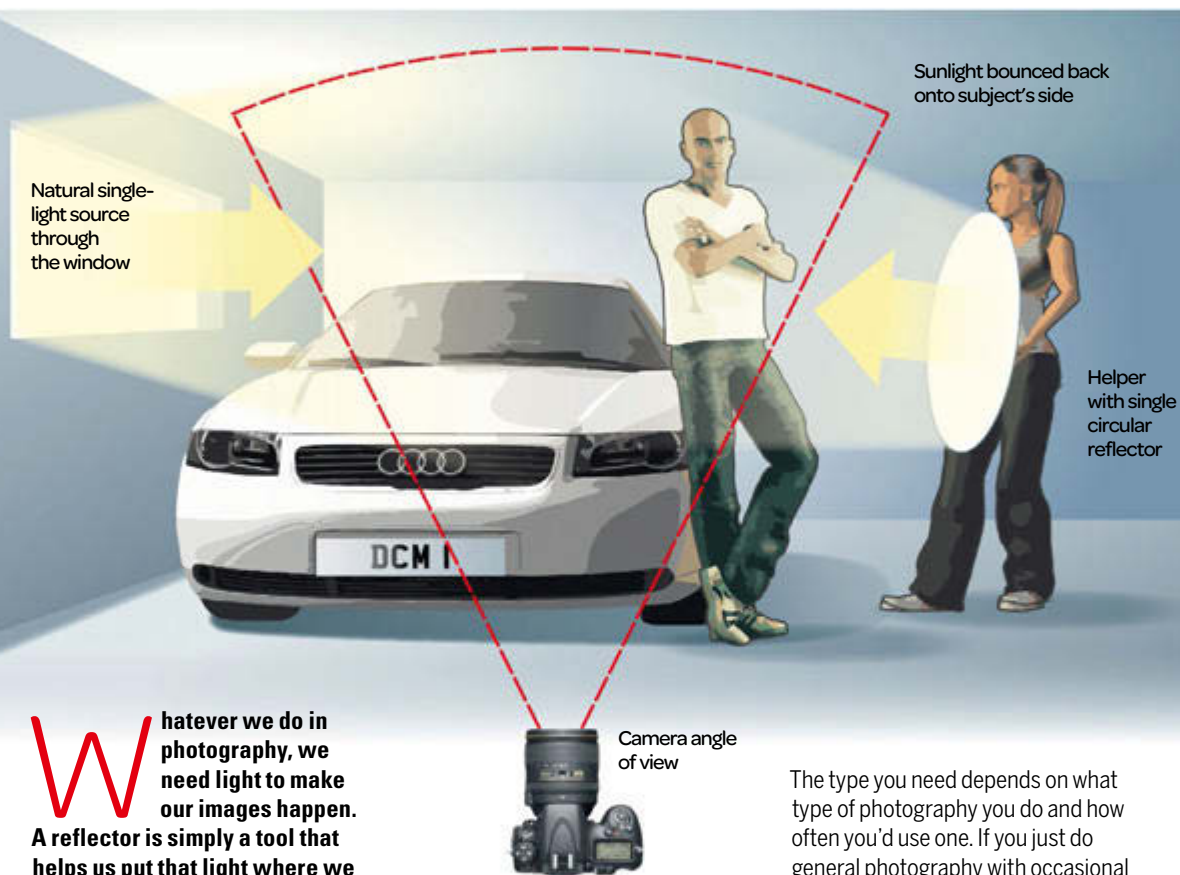
The guide number indicates a flashgun's maximum power output, and helps you work out manual flash exposures. You do this by dividing the subject distance (in metres) into the guide number:

Aperture = guide number / subject distance

For example, if your flash has a guide number of 12 and your subject is 2m away, the correct aperture would be $12/2$, or f/6. The guide number is dependent on the ISO – at higher ISOs the flash power, and hence the guide number, increases. Guide numbers are usually quoted at ISO100, although on some cameras it's ISO200. Modern flash systems use automatic exposure measurements, and control the flash duration in a way that makes manual calculations largely obsolete, although guide numbers are still useful for comparing the power of flashguns.

Reflector

Bounce light where it's needed with one of these...



Whatever we do in photography, we need light to make our images happen. A reflector is simply a tool that helps us put that light where we want it. A reflector allows you to bounce available light – whether natural or artificial – back towards your subject, so you can change the way the light illuminates it. Reflectors come in various shapes and sizes, although the most common shapes are circular and rectangular. They are made from reflective material, usually in white, silver or gold for different effects. Some have handles or can be folded

together for easy storage, while others are large and difficult to handle. You can even make your own reflector from white card. All photographers should have at least one reflector at their disposal, even if it's just a small one. In certain circumstances it will come to your rescue and make a big difference to the quality of an image. When you see the difference they can make, you'll be instantly convinced.

The type you need depends on what type of photography you do and how often you'd use one. If you just do general photography with occasional portraits, then a small circular pop-up reflector that has both silver and white sides may be the best option. You can get these with different covers so that you have a choice of white, silver and gold. Our favourite is a 32-inch diameter circular reflector that folds down small enough to slip into the side of a camera bag. Larger reflectors will generally give you a better spread of softer light, but aren't so easy to carry or handle.

Which colour do you need?

All reflectors work in the same way, but the colours make a difference in your shots



Silver reflector

A silver reflector reflects a large amount of light. It's best to use these at some distance if you're working in the studio otherwise the light can look too harsh. If you want to make your own, silver foil works a treat. However, they're not too expensive and most reflectors come with several covers, such as white, silver and gold, so getting one is a good investment.



Silver reflector



Gold reflector

Gold is best avoided with studio flashlights, which are usually balanced to daylight, because the warm glow that it radiates is likely to create mixed lighting in your final images. This will only mean more work in the digital darkroom later on. If you're working outside, using a gold cover warms skintones up beautifully.



Gold reflector



White reflector

A white reflector is ideal when working in the studio because it creates a softer, colour-neutral fill light. You don't have to use a specially-made reflector; a large piece of white card can be just as effective. Professional studios often use huge sheets of white foamboard. While they're not that expensive, they take up a lot of space.



White reflector

Spare battery

Never leave home without back-up power!

Twin cells

Your camera's battery contains not one cell but two, each with a nominal output of 3.7 volts, and giving a combined output of 7.4 volts

On-board computer

Hidden inside your rechargeable battery pack is a circuit board that helps regulate the output of the battery and ensures correct charging. It also has safety features, such as a heat sensor, built in

Making contact

These areas make contact with the terminals inside the camera's battery compartment and the battery charger. These need to be kept clean, and should be kept away from metal objects to avoid a short circuit



Size matters

Different SLRs use different batteries – an important factor to consider when it comes to upgrading your SLR

Heat vent

Each individual cell has its own heat vent and terminals, and they are linked together in series to create a connecting circuit

Layers

The battery is made up of alternating layers of two chemicals, between which the reaction occurs. Each of these layers is separated by a micro-perforated plastic so that they don't touch, but through which the ions can pass freely

Chemical composition

The anode chemical is normally graphite, and the cathode material is most often lithium cobalt oxide. An electrolyte material is also added to aid electrical flow

We take it for granted, but you simply can't take pictures with digital cameras without a battery. While some old-fashioned film cameras can use human mechanical power to cock the shutter, lift the mirror and wind on the film, all digital cameras have so many electronic components that they become little more than a paperweight when they run out of electricity to run on. Powering the LCDs, processors and circuitry is one thing, but the cells also provide power for a number of high-drain motors, because your camera is still a very mechanical machine. The shutter, mirror, image stabilisation and lens focusing are all

powered from this one battery. Then there's the built-in flash, which drains a significant amount of power from the cells to fill the high-voltage capacitor needed to provide the charge that creates its spark of light. A flash-lit picture takes almost twice the power of a flash-free image to create.

We might think of rechargeable batteries as a renewable energy source with a low running cost, but they don't last forever. Typically, you can expect your battery pack to last for around 500 charge cycles before it will need to be replaced, but this longevity can vary significantly in practice. Lithium-ion cells will lose about five to ten per cent of the charge a month even if they aren't

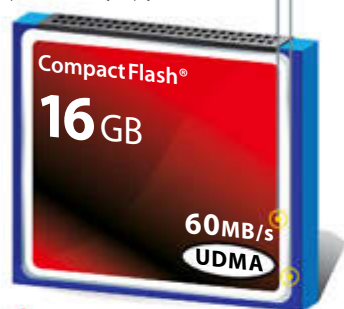
used, and if they are left idle to self-discharge they may not recover, so try to use your spare batteries in rotation. One of the big advantages of lithium-ion batteries is their lack of 'memory' effects. You don't need to charge your battery fully before using it, or discharge it fully before charging it. Complex monitoring circuitry in the charger and the battery ensures that the charging process is optimised and typically takes a couple of hours. Don't worry about overcharging; the circuitry will detect when the battery is full. Temperature plays a role too. In warm climates, a battery won't give you as much service as in a cold one. If you live in a hot country, it may pay to ensure you keep your batteries cool.

Memory cards

Your camera will use one or more of these card types to store images

Transfer speed

The faster the speed, the better the performance at continuous shooting, for stills or video. The maximum data transfer speed is often measured in megabytes per second (Mb/s)



CompactFlash

The traditional SLR memory card once came in two thicknesses – 3.3mm (Type I) or 5mm (Type II). These days, all CF cards are the thinner Type I

UDMA

The latest generation of CompactFlash with the fastest transfer speeds use the UDMA (ultra direct memory access) protocol

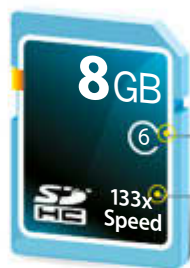


XQD

Billed as a newer, faster replacement for CompactFlash cards, these have had limited take up

Capacity

Storage space is measured in gigabytes (Gb). Older memory cards may be measured in megabytes (Mb)



SD

Now the most popular memory card format. It comes in three types: SD, SDHC and SDXC

Transfer speed

Some cards measure data transfer as an 'x factor' rather than in Mb/s. 133x is equivalent to 20Mb/s

Class

SD cards also come in different classes, designed to give you an idea of sustained write speed (which is important when recording video). A Class 2 card will deliver a write speed of at least 2Mb/s; a Class 6 card (as in the diagram) gives a performance of at least 6Mb/s, and a Class 10 card offers speeds of over 10Mb/s

Your SLR enables you to record your images as two different file types – raw and JPEG. But if you switch between the two using your camera's image quality menu you will see a range of options. JPEG is the world's most popular digital image format. These files can be opened by many different computer programs, and the file size is scalable. Images can be compressed so that the file size is smaller – a property that is particularly useful with email. Compression comes at a price: the more compressed a file is, the more the image quality deteriorates. You usually get three levels of compression to choose from – high quality, medium, and low. Your camera also gives you a choice as

to how many pixels you want your picture to have. To choose the maximum number your sensor allows, select large. To get the smallest file sizes and to fit the most shots on your memory card, you could choose the small size and basic quality settings, but in almost all situations, you should record large images at fine quality or choose the superior raw format.

The raw option stores the data in a semi-processed state (like a digital negative). It captures more tonal information than a JPEG, which makes raw images invaluable for editing purposes. Raw files are larger in size than JPEGs, so they fill up your card quicker, and take longer to process in the camera. For high-speed

continuous shooting, you can shoot longer sequences without the buffer filling up if you switch to JPEG.

The reason for all these file size and quality adjustments is to enable you to make the most of your memory card space. But memory is a lot cheaper than it used to be, so while it's worth picking the most efficient size and quality settings for your needs, it's not worth compromising on quality to get more images on the card – instead, get a bigger card! Card capacity isn't the only consideration, because today's SLRs combine higher resolutions with higher continuous shooting speeds, which means large amounts of data must be saved to the memory card quickly.

400MM

CHAPTER 2

35MM 63°

70MM 34°

400MM 6°

200MM 12°

50MM 47°

Quick reference

Key photographic concepts explained
with easy-to-follow diagrams

20MM

15MM FISHEYE 180°

20MM 94°



In this section

- 26 Exposure
- 29 Shooting modes
- 30 Aperture
- 34 Shutter speed
- 38 ISO sensitivity
- 40 Metering
- 42 The histogram
- 44 The viewfinder
- 45 Angle of view
- 46 White balance
- 47 The colour wheel
- 48 Autofocus
- 50 Hyperfocal focusing
- 51 Digital processing
- 52 Studio photography

Exposure

Master the art of exposure and get pictures with punch by balancing aperture, shutter speed and ISO

Understanding how exposure works is probably the most fundamental photographic skill you need to master. Learn how to control your camera's aperture, shutter speed and ISO and you'll be able to take control of how your images look.

Whether you want to isolate the subject of your photo from the background with a shallow depth of field, or capture the misty effects of moving water as part of a moody seascape, you'll need to understand the basics of exposure.

At first it might seem that there are just too many options with apertures, histograms, ISOs, metering modes, f-stops and so on to juggle. However, once you understand the basic principles you'll have all the tools you need to take control and get creative. Today's digital SLRs come with functions and features to help you get the best out of your exposures, and they are all without doubt useful, but concentrate on the fundamental relationship between aperture, shutter speed and ISO, and maybe even restrict yourself to manual mode to begin with, and you'll learn the essence of creative photography.

Creating a harmonious exposure using the aperture, shutter speed and ISO is a juggling act. As soon as you make a decision about one

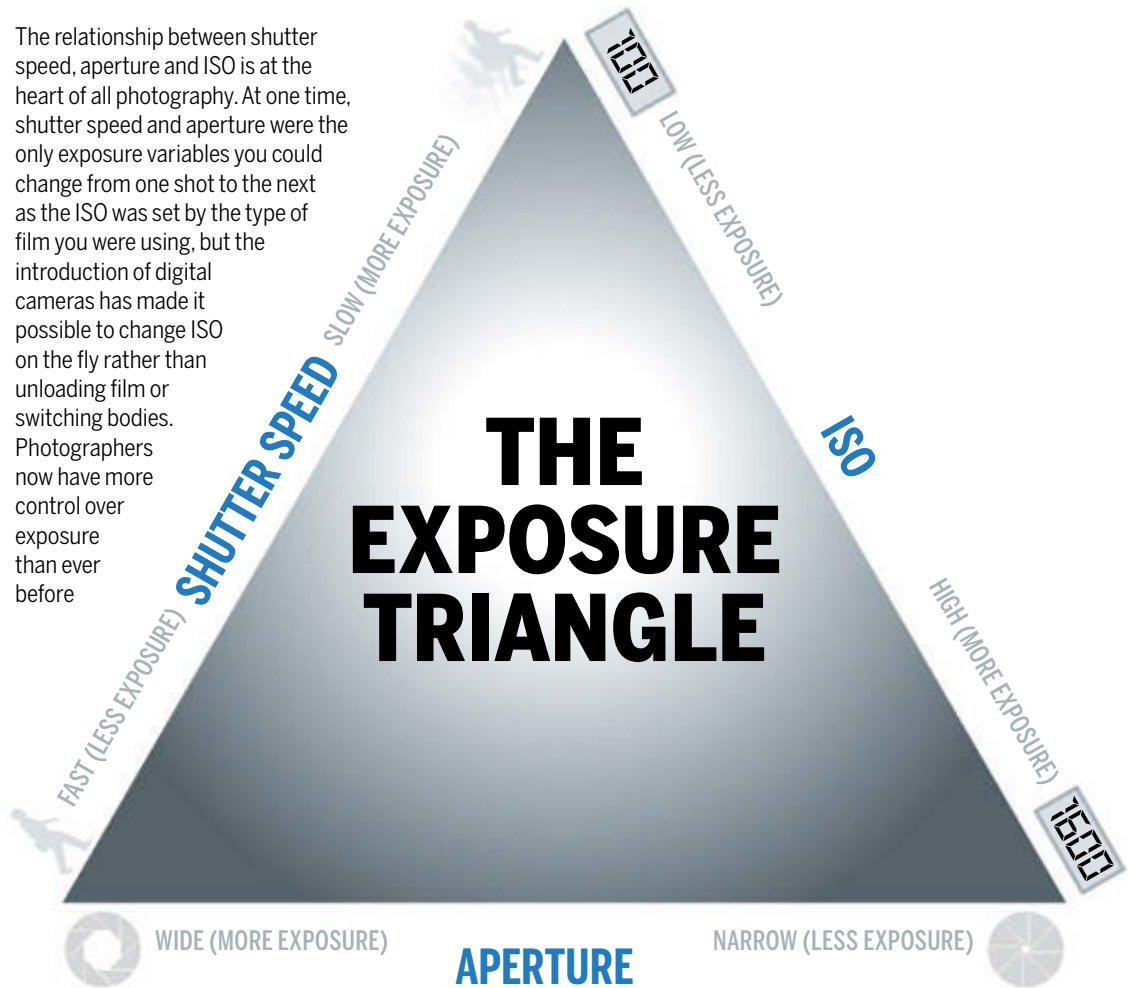


element, you'll need to compromise with another. The trick is get all three elements working together so you get the results you want and not what the camera tells you you can have. Because of that, it's really worth putting in the groundwork and getting to grips with the basics of

shutter speed (how long the camera's sensor is exposed to the light), aperture (how much light the lens lets in, which also affects depth of field) and ISO (the sensitivity level of the sensor). Once you know how to do this, there's nothing you can't do. Of course, getting a correct

Understand how exposure works by following this simple three-pointed guide

The relationship between shutter speed, aperture and ISO is at the heart of all photography. At one time, shutter speed and aperture were the only exposure variables you could change from one shot to the next as the ISO was set by the type of film you were using, but the introduction of digital cameras has made it possible to change ISO on the fly rather than unloading film or switching bodies. Photographers now have more control over exposure than ever before



exposure relies on the camera having achieved the optimum exposure reading to begin with, but this doesn't always happen. This is where exposure compensation plays a part.

Exposure compensation can be applied in aperture priority, shutter priority or program mode. It's also

measured in stops: the exposure indicator scale you see in the viewfinder or on your camera's rear display has stops clearly marked on it. You can usually increase or decrease the exposure by up to five stops.

You'll see that there are smaller marks on the scale, too. These

represent half-stops or third-stops, depending on how your camera is set up. Although exposure can be shifted in full stops, you get much finer control by adjusting the exposure in these smaller increments. You'll learn how to judge the adjustments needed once you understand histograms.

ONE EXPOSURE, THREE WAYS

There are three camera settings that enable you to control the exposure of a picture: aperture, shutter speed and ISO. All three elements need to be balanced to produce an acceptable exposure. This is where thinking about

exposure in terms of stops helps, as you can see in our examples of 'exposure maths'. The three exposures below would produce three images that have the same level of overall brightness, but each will look slightly different.

Aperture	Shutter	ISO
f/2.8	1/30	3,200
f/4	1/60	1,600
f/5.6	1/125	800
f/8	1/250	400
f/11	1/500	200
f/16	1/1000	100

This setting offers a reasonable depth of field with some risk of visual noise

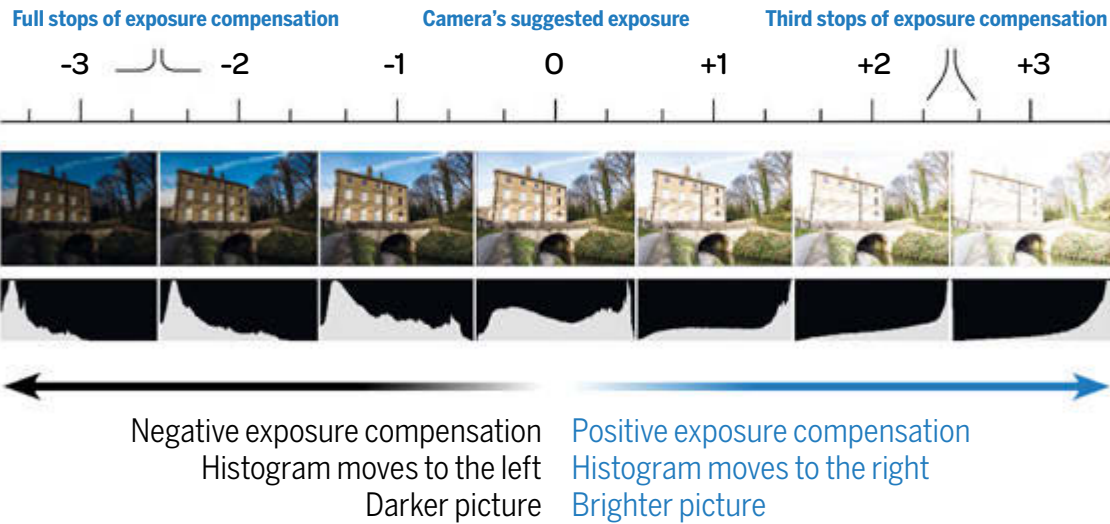
Aperture	Shutter	ISO
f/2.8	1/30	3,200
f/4	1/60	1,600
f/5.6	1/125	800
f/8	1/250	400
f/11	1/500	200
f/16	1/1000	100

Increasing the aperture to f/4 means the shutter can be open for less time

Aperture	Shutter	ISO
f/2.8	1/30	3,200
f/4	1/60	1,600
f/5.6	1/125	800
f/8	1/250	400
f/11	1/500	200
f/16	1/1000	100

Alternatively, a slow shutter speed means a narrower aperture is possible

EXPOSURE COMPENSATION



It's not uncommon for your camera's exposure meter to make mistakes. It's calibrated to produce a balanced exposure, but bright or dark scenes can fool it into dishing up images that are underexposed (too dark) or overexposed (too bright). Your camera's exposure compensation

function enables you to rectify this – or simply make a picture a little brighter or darker if that suits the subject or your tastes better. The exposure setting that's adjusted when you use exposure compensation is determined by the shooting mode the camera is in. In

aperture priority mode, the aperture that you set remains fixed, so it's the shutter speed that's increased or decreased. In shutter priority mode, it's the aperture value that's altered to give a brighter or darker result. The ISO may also be adjusted if you've set it to Auto ISO.

Aperture

Understand aperture and f-stops and you'll get sharper, more creative shots

The concept of aperture can be tricky to grasp. The physical side of it is incredibly simple. Here's what's going on inside your lens barrel, where a motor keeps aperture under control...

Iris blades

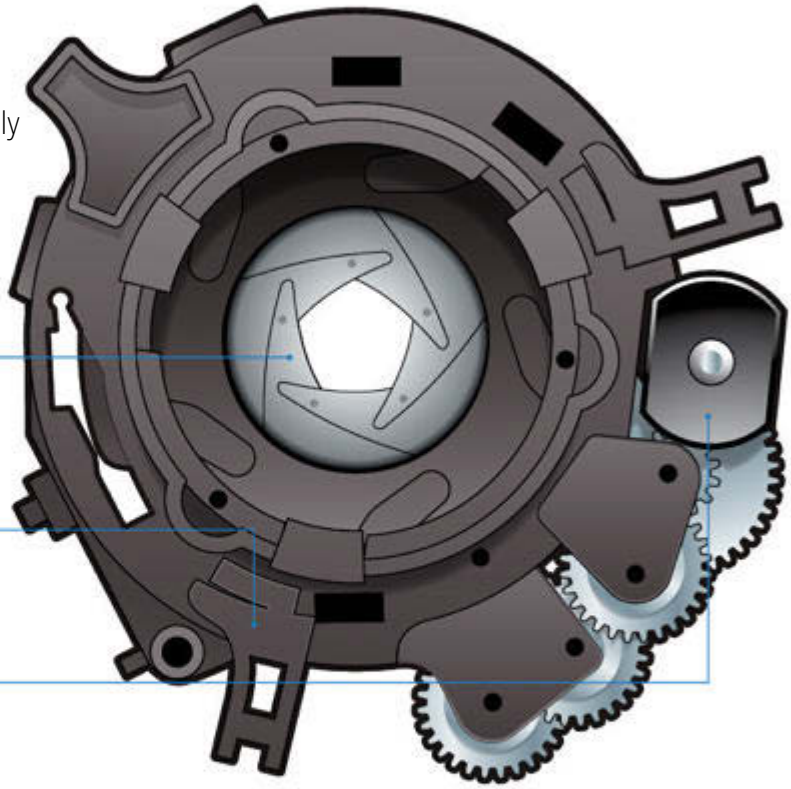
The aperture is created by a diaphragm formed by intersecting blades. These usually number between five and nine on any one lens

Lens component

The aperture assembly is located in the barrel of each lens you use, between the lens elements

Motor

This opens and closes the aperture when the shutter fires. It matches the f-stop set by you or the camera, and the focal length you're using



No matter what camera or exposure mode you use, there are just two main ways to regulate how much light reaches an image sensor. One is shutter speed, which we'll examine on page 34. The other is aperture. Aperture has an important effect on depth of field, which we explore on page 33, but it can impact on the sharpness of your images in other ways, too. It's also directly related to the working

distance when you're using flash, and maximum aperture is an important factor in differentiating lenses. Yet the concept of aperture can be confusing. For example, it's described by irregular numbers such as $f/2.8$ and $f/5.6$. And in topsy-turvy fashion, big figures relate to small apertures and vice versa.

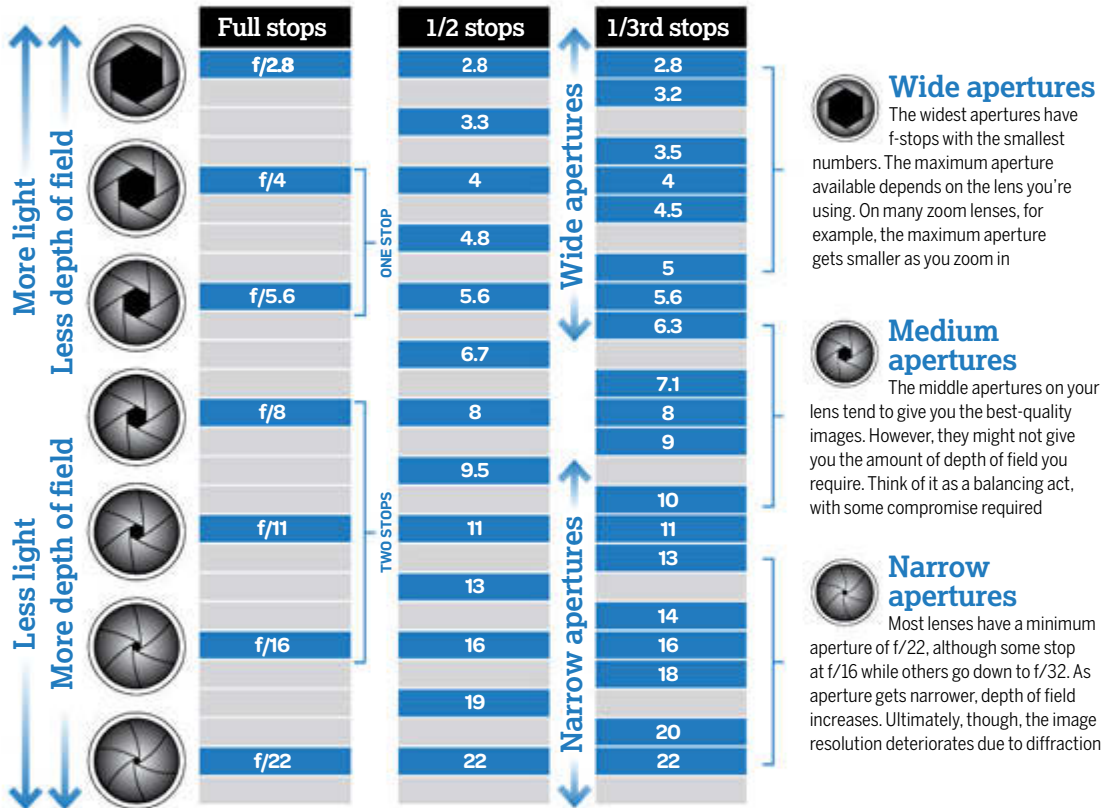
So what is aperture anyway? Well, it's not just a bit of jargon – the word means a hole, or opening. More specifically, the

aperture is an opening located within each lens. Its size is controlled by a diaphragm that performs in a similar way to the iris in your eye. Maximum aperture varies between lenses.

It's easy to understand that a small opening will admit less light than a big one. However, the idea can get confusing because of the system used to describe the aperture's size. There is logic to it, though!

Making sense of f-stops

Your at-a-glance guide to aperture scales and what the numbers mean



The crucial point is that aperture numbers are fractions: $f/2$ means focal length (f) divided by 2. So on a 50mm lens, for example, $f/2$ means the diameter of the aperture is 25mm. On a 200mm lens at $f/2$, the aperture would be 100mm wide. This helps explain why bigger numbers refer to narrower apertures.

However, the amount of light that can pass through an aperture is proportional to the opening's area, not its diameter. If you halve the diameter (from $f/2$ to $f/4$, for example) the area decreases by a factor of four. It's the in-between setting of $f/2.8$ that gives half the area and half the amount of light. This is why the aperture scale

includes seemingly irregular numbers such as $f/2.8$ and $f/5.6$. In traditional photographic terminology, halving or doubling the amount of light is called a 'one-stop' change. We often refer to it as 1EV, or exposure value, but it means the same thing. It comes in useful when working out exposure compensation.

Aperture range

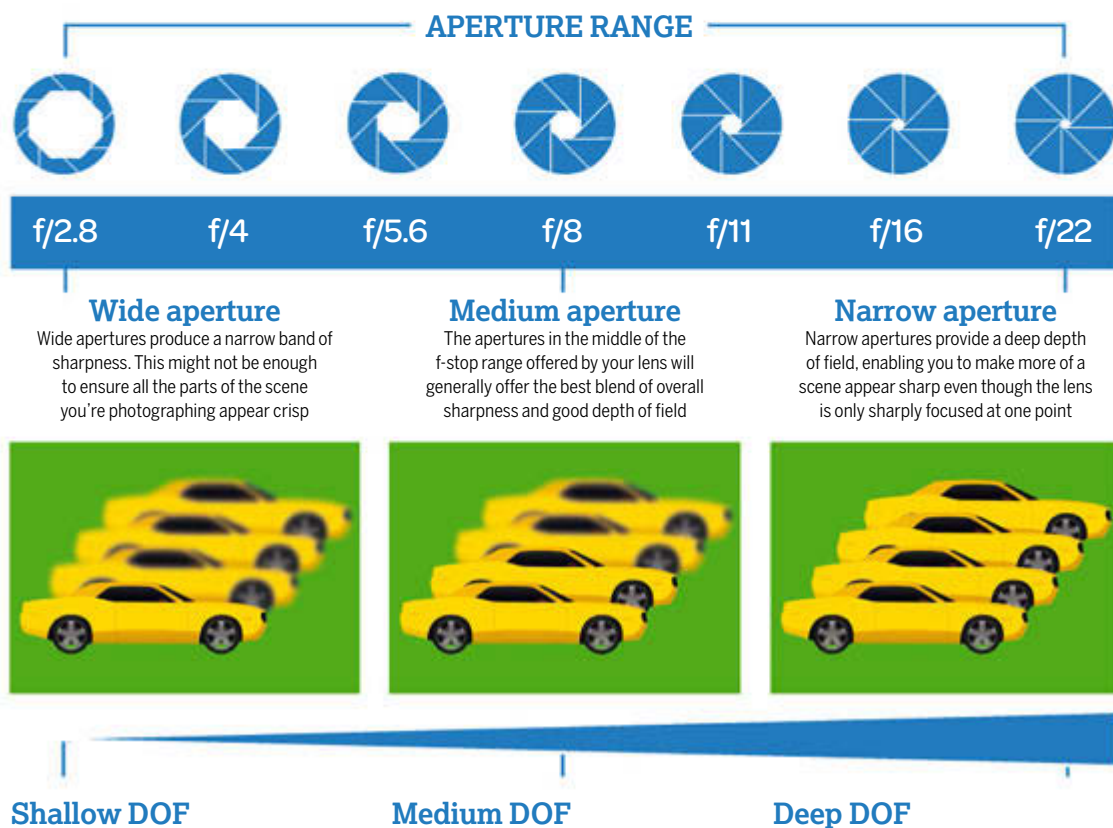
What apertures are on offer, and what happens when you move between them?

The majority of lenses use a standard scale of f-stops to indicate the size of the aperture, although the range of settings available varies depending on the lens being used. For instance, a 100mm macro lens typically offers an aperture range of f/2.8 to f/32, while a 28mm f/1.8 lens typically offers a range of f/1.8 to f/22. Each time the aperture is opened by one stop

(from f/11 to f/8, say), twice as much light is let in. The reverse is also true: close the aperture by one stop and half as much light makes it to the camera sensor.

There are two key reasons for changing the aperture. First, it ensures the sensor receives the right amount of light. If you're shooting in the dark, for example, or you want to be able to use a fast shutter speed to freeze a

fast-moving subject, then you may need to use a wider aperture to let in more light. If you're shooting in the daytime or you want to use a slow shutter speed for a creative blur effect, then you may need to use a narrower aperture. The other reason to change the aperture is to change the depth of field. Wide apertures create a shallow depth of field, whereas narrow apertures create a deep depth of field.

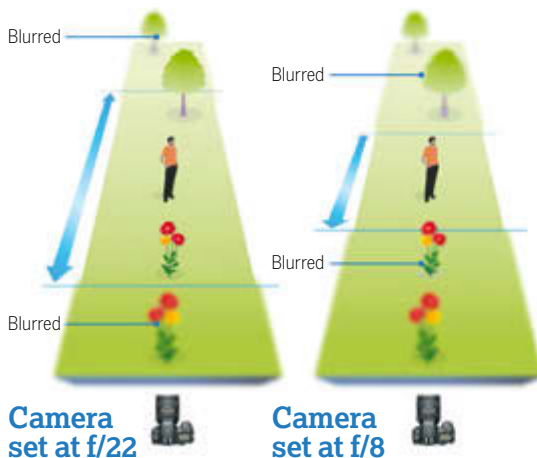


Depth of field

How the choice of aperture can affect the look of a picture

Depth of field is an important consideration when you take a photo. It's a measure of the extent to which the scene or subject looks sharp, and extends both in front of and beyond the point you've focused on. There are a number of factors that affect this, such as the distance at which the lens is focused and the combination of the focal length of the lens and the size of the sensor in the camera. However, the choice of aperture plays a significant role. In the examples here, the focus distance remains the same – somewhere in the middle distance – and it's the change of aperture that makes more or less of the image appear sharp. However, the closer you focus, the shallower the depth of field becomes. In macro photography, even narrow apertures may only produce a depth of field that's measured in millimetres. Conversely, the further you focus, the greater the depth of field. Focus far enough into a landscape, and it will be sharp using mid-range apertures. Normally, the image displayed in the viewfinder is at the lens's maximum aperture. This can make it impossible to judge the depth of field.

Narrow aperture Wide aperture

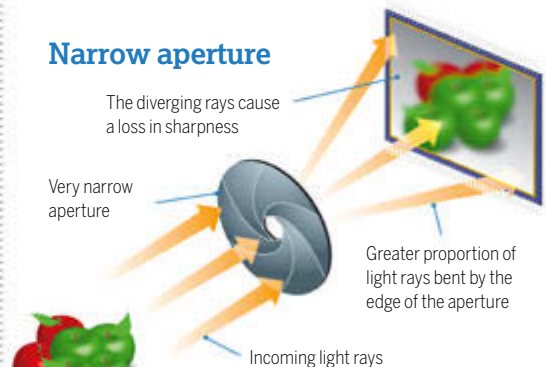


Diffraction

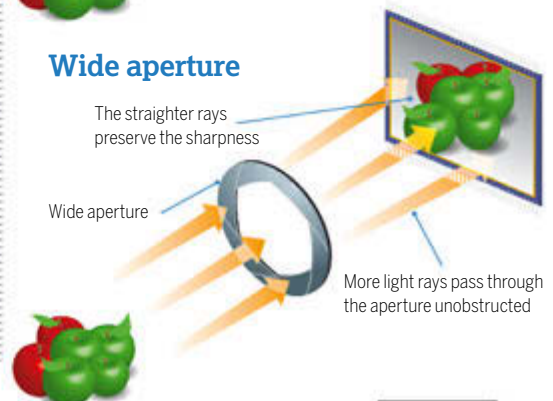
Why narrow apertures can lead to soft-looking shots

As light waves pass through the aperture, they are deflected by the hard edges of the diaphragm blades and spread out. This effect is called diffraction, and it occurs at all aperture settings. However, at narrow apertures the effect is more pronounced, and details in the image become progressively softer despite the lens being focused accurately. There comes a point where the depth-of-field gain that comes from using a very narrow aperture is cancelled out by the lack of overall sharpness. The precise aperture at which diffraction starts to become a problem varies according to the lens being used, but apertures beyond $f/16$ are generally best avoided if sharpness is crucial. The sweet spot is often somewhere in the middle, between $f/8$ and $f/11$.

Narrow aperture



Wide aperture



Shutter speed

Choosing the right shutter speed is the key to getting your shots sharp, but also to creating blur

When you press the shutter release button, there are a number of mechanical processes that have to happen before the light reaches the camera sensor and a picture is recorded. First, the mirror, which reflects the image into the viewfinder and allows you to focus and compose the shot, has to flip out of the way, which is why the viewfinder goes dark. Next, the shutter curtains, which prevent light from hitting the sensor, open and close...

Front shutter curtain

When the front curtain opens, the exposure begins. It's ended by the rear curtain moving back into place, followed by the first curtain

Light passing through the lens

Mirror

The mirror moves out of the way at the start of the exposure

Rear shutter curtain

The rear curtain opens first, before the exposure begins, but the sensor is still blocked by the first curtain

Photographers work very hard to get their subjects perfectly sharp, and to create just the right degree of background blur in their images, but it's a mistake to imagine that focusing and lens aperture are the only controls that count. In fact the shutter speed plays an equally important part in controlling sharpness. The lens aperture can control the sharpness with depth, but the shutter speed does the same thing with an entirely

different dimension – time. If you're photographing an object that's still, the shutter speed may not be a factor, but most everyday subjects show some kind of movement, and this is where the shutter speed becomes important. When you're working out what shutter speed you need, many factors come into play, such as the speed your subject is travelling at, its distance, and the angle you're shooting from. For some subjects, such as a speeding race car, there may not be a shutter speed fast

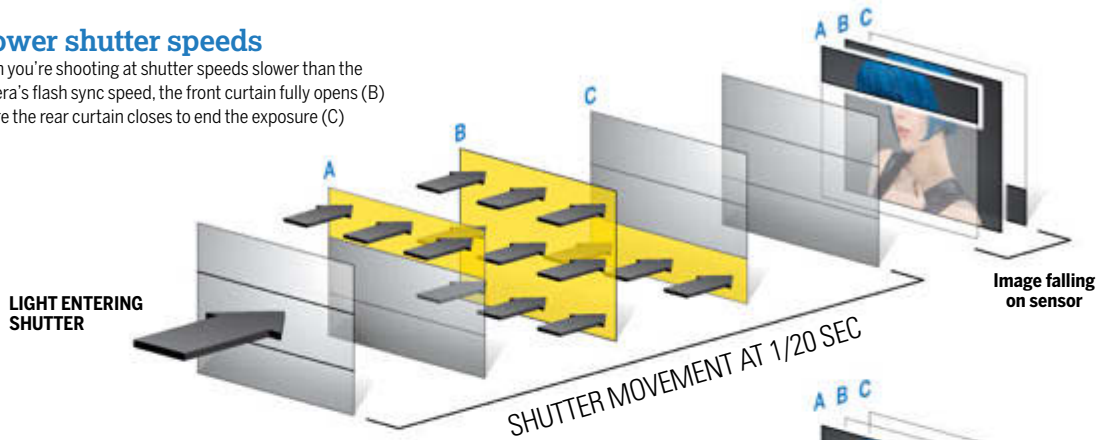
enough. That's why action photographers 'pan' with the subject to keep it centred in the frame. It's the subject's speed across the frame that causes the blur, not its speed in real life, and following your subject in the viewfinder is the secret to pin-sharp shots. When you take a panning shot, it's the background that comes out blurred, and this is just one example of a situation where you can use relative movement for creative effects. Waterfalls and seascapes are other classic examples.

HOW THE SHUTTER WORKS

Discover how shutter speed affects the build up of the image on the sensor

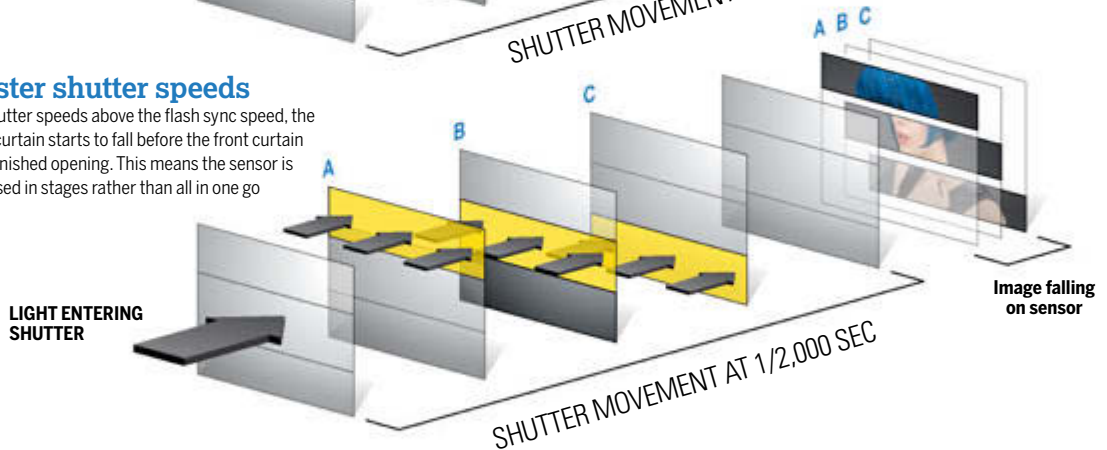
Slower shutter speeds

When you're shooting at shutter speeds slower than the camera's flash sync speed, the front curtain fully opens (B) before the rear curtain closes to end the exposure (C)



Faster shutter speeds

At shutter speeds above the flash sync speed, the rear curtain starts to fall before the front curtain has finished opening. This means the sensor is exposed in stages rather than all in one go



Digital SLRs use a pair of 'vertical-run focal plane' shutter curtains or blinds, positioned just in front of the sensor. These open and close to expose the sensor to light; the front blind opens to start the exposure, before the rear curtain drops down to end it. At slower shutter speeds, both curtains will be open for some of the exposure, but at faster shutter speeds, the rear curtain begins closing before the front

curtain has fully opened. This means that the sensor is effectively exposed through a moving slit, which can prove a problem when shooting with flash, because only part of the sensor will be exposed when the flash fires. This is why you need to consider the 'flash sync speed' when using flash: this is the fastest shutter speed at which the entire area of the sensor can be exposed at the same time (usually 1/200 sec or 1/250 sec). See pages 18-19 for more information about the



relationship between flash sync speed and shutter speed.

Using two shutter curtains ensures that exposures are consistent. Even though the top part of the sensor is exposed first as the front curtain opens, it's this area that's covered first by the rear curtain. If you notice inconsistencies in exposure across a picture, this may be a sign that the shutter needs replacing. Over time, wear and tear takes its toll on this rapidly moving element.

PHOTOGRAPHING ACTION

Learn how to control your shutter speed, and understand how it affects the other camera settings



Blurred subject

Camera is stationary
Shutter speed is 1/100 sec



Result

Background is sharp
Moving subject is blurred

Frozen in time

Camera is stationary
Shutter speed is 1/2,000 sec



Result

Background is sharp
Moving subject is sharp

Tracking the subject

Camera is panned
Shutter speed is 1/100 sec



Result:

Background is blurred
Moving subject is sharp

Shutter priority is a good mode when you're shooting active subjects. It enables you to 'lock in' a suitable shutter speed and ensure you get sharp results. If the light changes, the camera will choose a different

aperture, and if you have Auto ISO selected, a different ISO setting. But what is a 'suitable' shutter speed? Too slow, and the subject will be blurred; too fast and you'll rob the image of any sense of speed. Often, a better option is to choose a slower

shutter speed, then use a panning technique. The trick here is to move the camera and track the subject, so it stays more or less in the same place within the frame, and is rendered sharply, while the fast-moving background is captured as a blur.

CAMERA SHAKE

How shutter speed can help you avoid the effects of wobbly cameras

When you're taking pictures without the support of a tripod, you need to consider the shutter speed, not just in terms of freezing subject movement, but also in terms of concealing the effects of camera shake. It's easy to neglect the shutter speed when you're shooting in aperture priority mode, but it can make the difference between a keeper and an image destined for the trash.

● Use the reciprocal of the focal length as a guide

– so if you're using a 500mm lens, aim for a minimum of 1/500 sec.

● If you've got a teleconverter attached to the lens, take this into account when working out the equivalent focal length. Do the same with a crop-sensor camera.

● You can get sharp results at slower shutter speeds using image stabilisation.



1/500 sec

1/30 sec

1/8 sec

HOW TO FREEZE A FAST-MOVING SUBJECT

It's not just the speed of your subject that counts, it's where you stand and the angle you shoot from, too



Heading straight at you

If you shoot your subject head-on there's no movement across the frame at all, only movement towards the camera, so a shutter speed two to three times slower is often possible. It becomes more of a focusing problem than a shutter speed issue – you need to get your camera's autofocus system set up correctly



Moving across the frame

This is where your subject's speed across the frame is highest. If you check our table below you'll see that a high shutter speed alone won't always be enough to get a sharp shot – you will need to pan with your subject too



45-degree angle

Your subject might be travelling at exactly the same speed as it was when seen side-on, but its speed across the frame will be halved. This means you can use a shutter speed half as fast to freeze its movement, and it will be easier to keep your subject centred in the frame. It's now moving towards the camera, though, so the autofocus will need to keep up

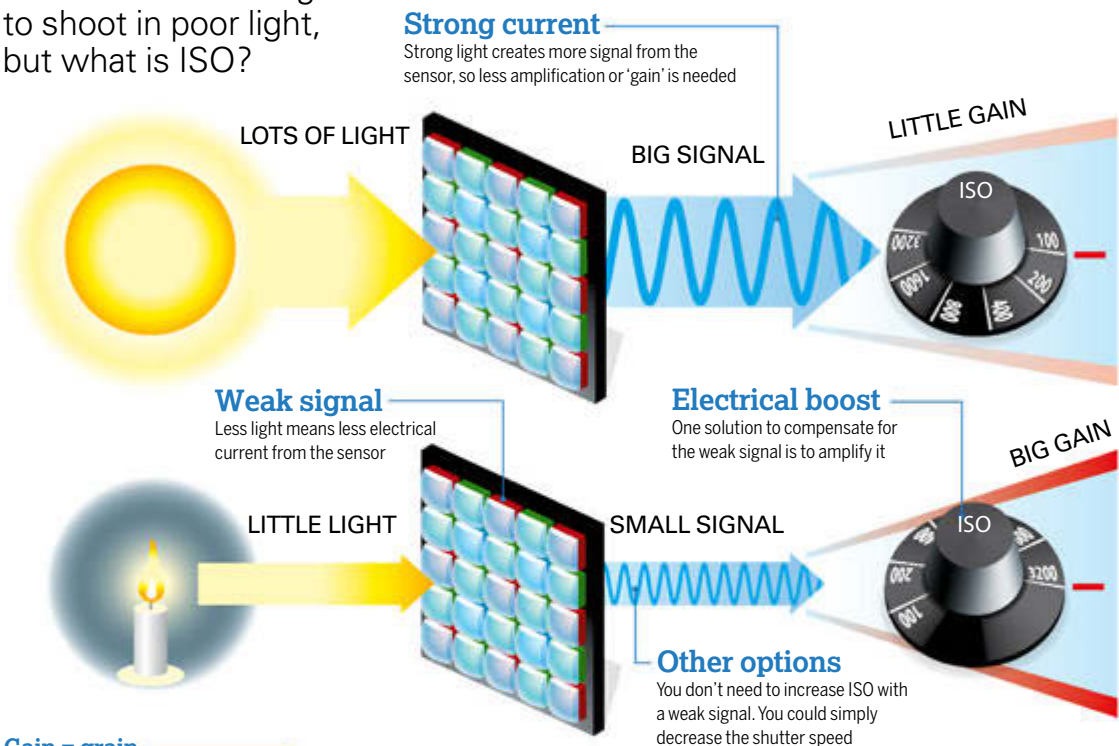
The key factor with moving subjects is their speed across the camera frame, not their speed in real life

Sharpness depends on just how far the subject moves during the time of the exposure. For a typical action subject such as a bike or car, you need the subject to have moved less than 2mm for a sharp shot, and less than 10mm for it to be any good

MPH	Metres per second	1/8000 sec	1/4000 sec	1/2000 sec	1/1000 sec	1/500 sec	1/250 sec
5	2	0.3mm	0.6mm	1.1mm	2.2mm	4.5mm	8.9mm
10	4	0.6mm	1.1mm	2.2mm	4.5mm	8.9mm	17.9mm
25	11	1.4mm	2.8mm	5.6mm	11.2mm	22.4mm	44.7mm
50	22	2.8mm	5.6mm	11.2mm	22.4mm	44.7mm	89.4mm
100	45	5.6mm	11.2mm	22.4mm	44.7mm	89.4mm	178.8mm
150	67	8.4mm	16.8mm	33.5mm	67.1mm	134.1mm	266.2mm

ISO sensitivity

You can use your camera's ISO setting to shoot in poor light, but what is ISO?



Gain = grain

The less the signal is amplified by the gain circuitry, the cleaner the picture will be, with less grain in the image



Low grain



High grain

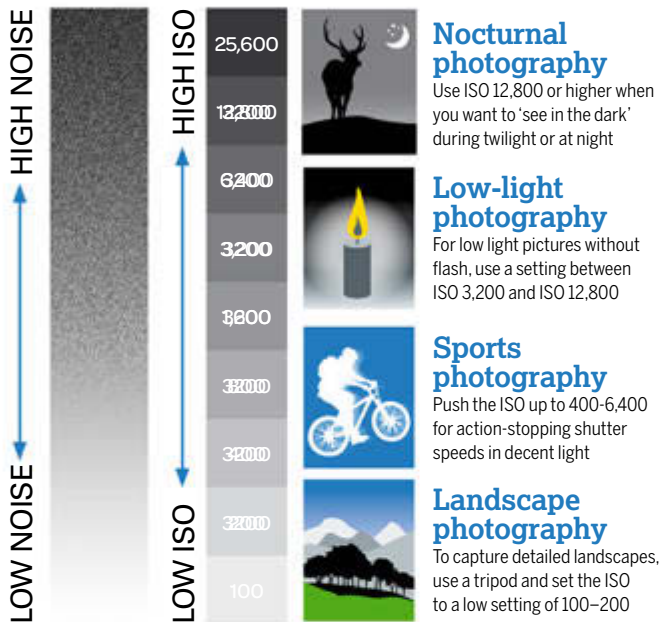
The ISO scale is used to measure the camera's sensitivity to light. Although the sensor cannot be changed to suit the subject (unlike film), its sensitivity can effectively be boosted by the camera's circuitry. This is done with the ISO control. The signal from the sensor is simply amplified, and this helps you get the fast enough shutter speed you want in low light. The ISO can be altered for each shot. This makes ISO a powerful tool for the photographer,

helping you to get sharp shots in a variety of lighting conditions.

The base sensitivity of D-SLRs varies according to the model – some start at ISO100, some at ISO200. Some cameras have an ISO button; you press and hold this while turning the main command dial to change the ISO setting. On others, you adjust the ISO using menus on the rear LCD display. Doubling the ISO number doubles the sensitivity of the sensor. So increasing the ISO from 100 to 200 means that, to get the same overall

ISO VALUES

Here's the typical standard range you'll find on your digital SLR



exposure, you can use a shutter speed half as long. Each doubling of the ISO also increases the sensitivity by a full exposure 'stop', or EV value, with the typical full-stop ISO scale going through 100, 200, 400, 800, 1600 and so on. The top ISO setting varies depending on the age and cost of your D-SLR.

However, the top ISO settings, and sometimes the lowest, on many cameras are displayed as 'Hi' or 'Lo' values. This is because they don't conform strictly to the ISO standard but still offer an effective ISO increase. It's best to avoid using high ISOs where possible, because each time you increase the ISO setting, you get a small decrease in image quality.

Boosting the picture signal also amplifies random variations in the signal, known as 'noise'. This shows up as grain and colour mottling in the image, and gets more noticeable the higher the ISO setting. D-SLRs have noise reduction options, but the side-effect of these is some softening of the detail.

Some photographers resist increasing the ISO to get the most grain-free images, but pumping up the ISO often actually increases the image quality overall, as it lets you use a faster shutter speed, thereby eliminating any camera shake. A grainy picture is always better than a blurry one! A higher ISO can also enable you to use a narrower lens aperture.

GET SHARPER RESULTS

Boosting the ISO can help you to freeze movement and add depth

ISO 100, 1/125 sec at f/2.8



ISO 1,600, 1/2,000 sec at f/2.8



FAST ACTION

In this example, 1/125 sec is too slow to freeze the subject. However, by increasing the sensitivity by four stops from ISO 100 (200 – 400 – 800 – 1,600), a shutter speed four stops faster can be used. Note that the overall exposure level remains the same.

ISO 100, 1/20 sec at f/4



ISO 1,600, 1/20 sec at f/16

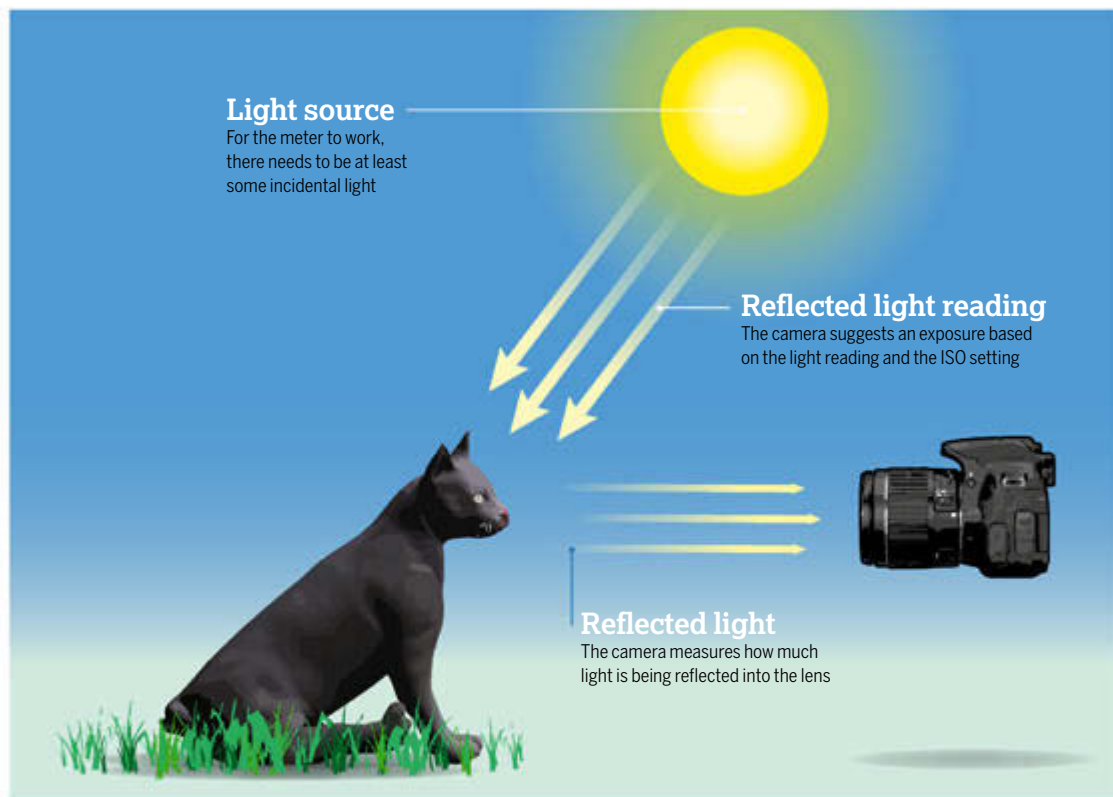


LANDSCAPES

Here, 1/20 sec gives a sharp handheld photo, but the wide aperture gives a shallow depth of field. Increasing the ISO by four stops enables an aperture four stops smaller to be used at the same shutter speed, providing a more extensive depth of field.

Metering

What are the matrix, centre-weighted and spot metering modes?



The camera meter measures a subject's brightness so that the camera can determine

how long the sensor needs to be exposed to record a picture. The problem is that the metering system doesn't always work flawlessly, and you may end up with pictures that are either too dark or too bright. For more refined results, you can correct these errors using exposure compensation, or dial in the exposure settings – aperture,

shutter speed and ISO – manually. Camera meters are calibrated to what's called '18% grey'. The theory is that a mid-tone grey, halfway between black and white, reflects 18% of the light falling on it. Point your camera at a grey card or a rough mid-tone equivalent, such as a field of grass or a pavement, and the camera will produce a well-exposed result. Obviously, not everything you photograph falls neatly into this mid-tone range. For instance, a swan in a snowy field

will reflect much more light, while a black cat in a coal cellar reflects much less. This is why photos of these subjects can look too dark or too bright: the metering system is trying to bring the overall exposure closer to mid-tone grey. The exposure for the swan will be decreased, so it comes out looking dull and grey, while the exposure for the black cat will be increased, so it comes out looking grey.

Digital cameras typically have three metering modes. The default

WHEN METERING GOES WRONG

Dark or light subjects can easily fox the system

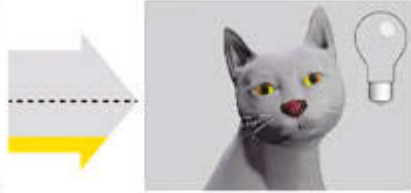
The tonality of the subject being metered makes a big difference to the exposure reading. The camera meter is calibrated to target 18% reflectance – roughly the amount

of light reflected by a mid-tone subject – so anything that reflects significantly less or more light than this can cause problems with the metering system.

Dark subject



A dark subject in a dark scene reflects relatively little light



The camera sees a mid-tone subject receiving too little light



The camera incorrectly increases the exposure

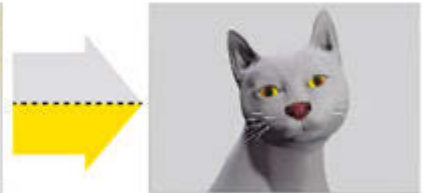
Light subject



A light subject in a bright scene reflects much more light



The camera sees it as a mid-tone subject receiving too much light



The camera incorrectly reduces the exposure

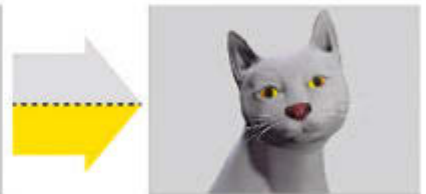
Midtones



A neutral grey subject reflects about 18% of the light



This matches what the camera meter is calibrated for



As a result, the camera makes no adjustment to the exposure

'pattern' metering mode takes a range of readings across the entire picture, then calculates the optimum exposure according to the brightness of the scene or subject. Canon calls this mode Evaluative, while Nikon plumps for Matrix – but they effectively do the same thing. This metering mode

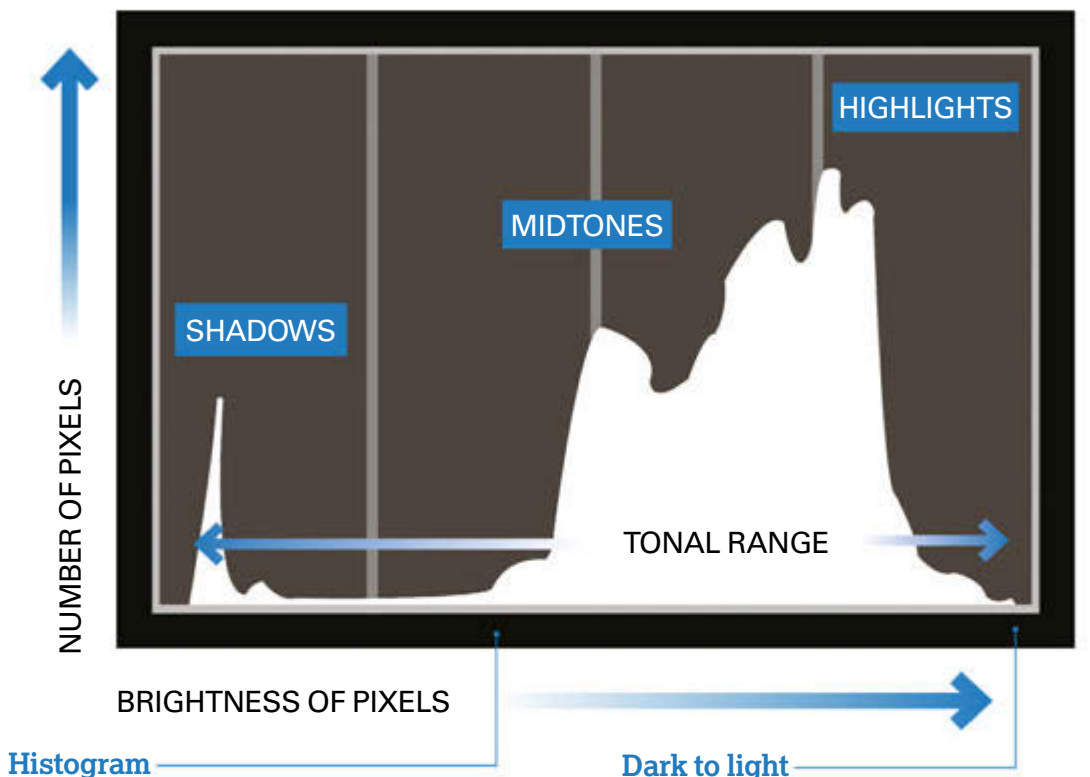
isn't a magic bullet: low light, bright or dark subjects or ones that are very small in the frame can still throw the metering out.

Your camera also comes with a centre-weighted metering mode. As the name suggests, this meters the whole scene, but gives priority to the centre of the frame.

Finally, there's spot-metering. This mode measures the brightness in a very small part of the frame. This is a great option when you want to lock the exposure on a small subject, or to take a number of readings from across a scene and then calculate the optimum exposure yourself.

The histogram

Discover how to interpret the chart on your SLR's LCD preview to get better exposures



Histogram

The shape and position of this black-and-white graph provides instant information about the exposure of the shot, and of the contrast of the scene

Dark to light

The graph plots the brightness of each pixel in the picture, from darkest on the left to brightest on the right. Vertical lines partition the graph into four segments, designed to make it easier to read

Histograms look like rather daunting technical graphs at first glance, but they are the most useful tool you have to help you capture the exposure you want, every time. And they are actually not nearly as daunting as they appear. The histogram is essentially a graph that illustrates

the range of tones in your image, from black on the far left to white on the far right with a mid-tone (18%) grey in the middle. As soon as you fire the shutter, a preview of your picture flashes up on the camera's LCD. You can instantly see if the shot is too bright or too dark, so it seems unnecessary to have a second, more scientific, way of judging the

suitability of your exposure settings. So why should you bother looking at the histogram?

First and foremost, displaying the histogram isn't a replacement for looking at the image itself when you evaluate a picture on your camera. Obviously, you need to assess the picture's composition, colour and tonal balance. But the qualitative

HOW TO MEASURE DYNAMIC RANGE

Use your measurements and this table to work out the best exposure



Measure the brightest area

Switch to manual shooting mode and select spot metering mode. Position the AF point over the brightest area.

Measure the darkest area

Adjust the shutter speed to centre the exposure bar, and make a note of the shutter speed. Do the same for the darkest area.



Check them on the chart

If the two readings are no more than 4EV apart (check the table on the right), choose a shutter speed right in the middle.



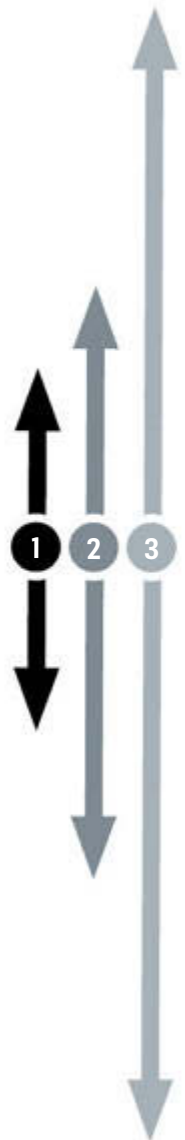
- 1 Less than four stops difference means you can afford to bias the exposure towards one or the other
- 2 Exactly four stops difference – you need to set a shutter speed exactly in the middle of the two you measured
- 3 More than four stops difference – shoot a series of exposures and combine them into one in software

nature of the preview image means it can be hard to see if an area of the shot is slightly too dark or slightly too bright. The histogram gives you this additional, and invaluable, information in a way that's easy to interpret at a glance.

Once you learn to read them, a histogram clearly shows the exposure of a shot, and whether you need to use exposure compensation to darken or lighten the exposure in

the next image you take. More importantly, it also tells you about the contrast in the scene. This enables you to avoid, or take special care with, subjects that have a greater dynamic range than your sensor can cope with. It also ensures that you get the best-quality results from your sensor when shooting low-contrast subjects. To get the right exposure in tricky scenes, you need to know the brightness range you're dealing with.

SHUTTER SPEED
1 sec
1/1.3 sec
1/1.6 sec
1/2 sec
1/2.5 sec
1/3 sec
1/4 sec
1/5 sec
1/6 sec
1/8 sec
1/10 sec
1/13 sec
1/15 sec
1/20 sec
1/25 sec
1/30 sec
1/40 sec
1/50 sec
1/60 sec
1/80 sec
1/100 sec
1/125 sec
1/160 sec
1/200 sec
1/250 sec
1/320 sec
1/400 sec
1/500 sec
1/640 sec
1/800 sec
1/1000 sec



The viewfinder

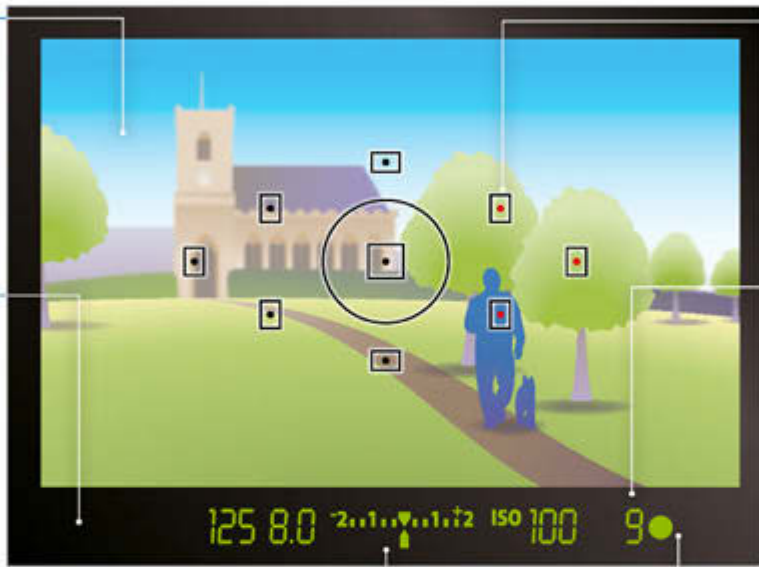
Your SLR's viewfinder provides lots of information about the photo you're about to take. Here's how to read it...

The image

Through the finder you can see the scene reflected by the mirror in front of the sensor

Symbols

The symbols on the left-hand side of the screen vary depending on what feature or button is engaged. For example, if you pop the flash, a lightning symbol will appear here. Note that some models of SLR switch the position of this symbol with the position of the focus confirmation light



Focus points

Your camera's focusing system is made up of a grid of focus points. The point or points of the image that are in focus light up

Number of shots

The number next to the focus indicator light indicates the total number of shots the camera can fire in a sequence. This will vary depending on how you have your camera set up

Exposure settings

In the middle of the screen, starting on the left is the shutter speed setting followed by the aperture. We then have the exposure compensation scale in the middle. When the needle is right in the centre of the scale, the camera considers the image to be well-exposed. To the right of this, the ISO sensitivity setting is displayed

Focus confirmation

A green circular LED will light up when the autofocus has locked on to a subject. It will blink if the AF cannot lock onto the subject, or if you are too close

Your SLR's optical viewfinder enables you to see through the lens you're going to use to take your photo. The light coming through the lens is reflected up into the viewfinder using a mirror, which you can see when you take the lens off your camera.

Normally, the image that you see in the viewfinder is shown with the lens at its maximum aperture,

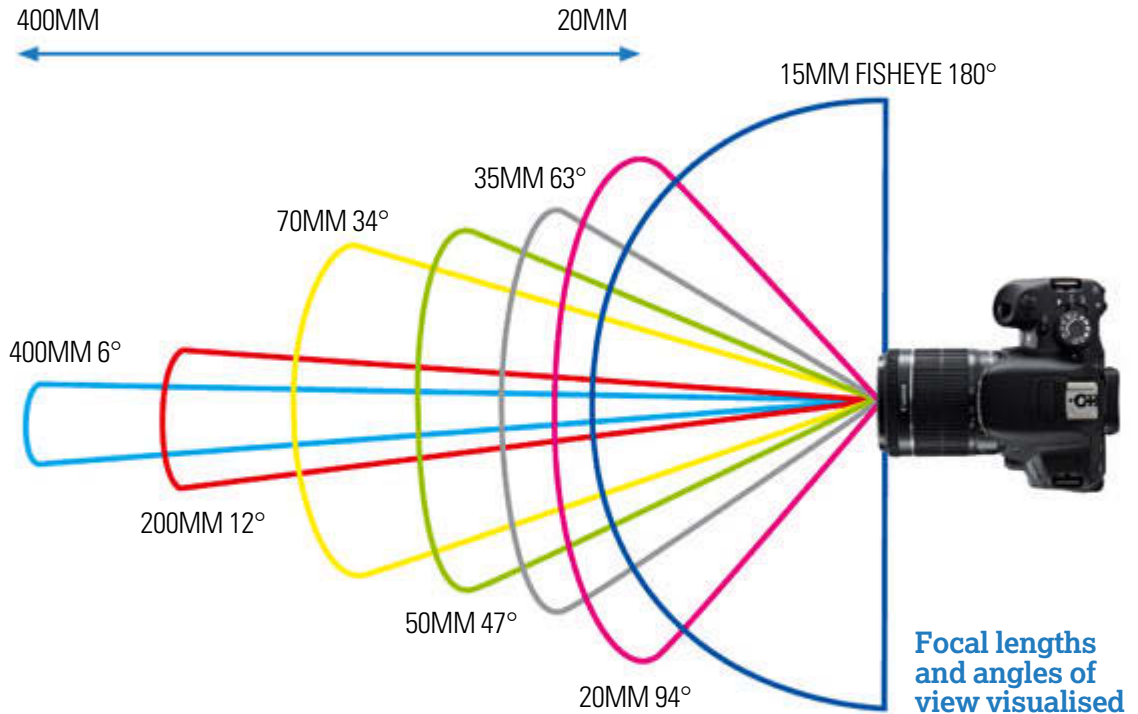
which means that it may not exactly match the appearance of your final shot. On many SLRs the viewfinder doesn't quite show you the whole of the frame, because there's an area around the edges of the image that isn't visible in the viewfinder. But because of the design and shape of an SLR, using the viewfinder with the camera held up to your eye is often a more stable way of holding the camera

than holding the camera to see the Live View screen.

The viewfinder gives you much more information than simply showing you what the camera is pointing at. On top of the image there's a display to indicate the area that the camera is going to focus on, and there's also a display along the bottom of the screen that gives you loads of information about the settings on the camera.

Angle of view

When framing, it's not just the focal length that matters. Here's how to choose the optimum lens to get it all in, or to get up close



Angle of view is the maximum view a camera is capable of 'seeing' through a lens, expressed in degrees. The choice of focal length is obviously key here, with longer lenses having a narrower angle of view than shorter lenses. For instance, a 200mm lens has an angle of view of 12 degrees, while a 20mm lens offers a wider angle of view of 94 degrees

on a full-frame camera. When it comes to zoom lenses, the angle of view changes according to the focal length the lens is zoomed at. However, the size of the imaging sensor inside the camera also affects the angle of view.

The angle of view can be measured horizontally, vertically and diagonally, but lens manufacturers often list just the diagonal, corner-to-corner angle

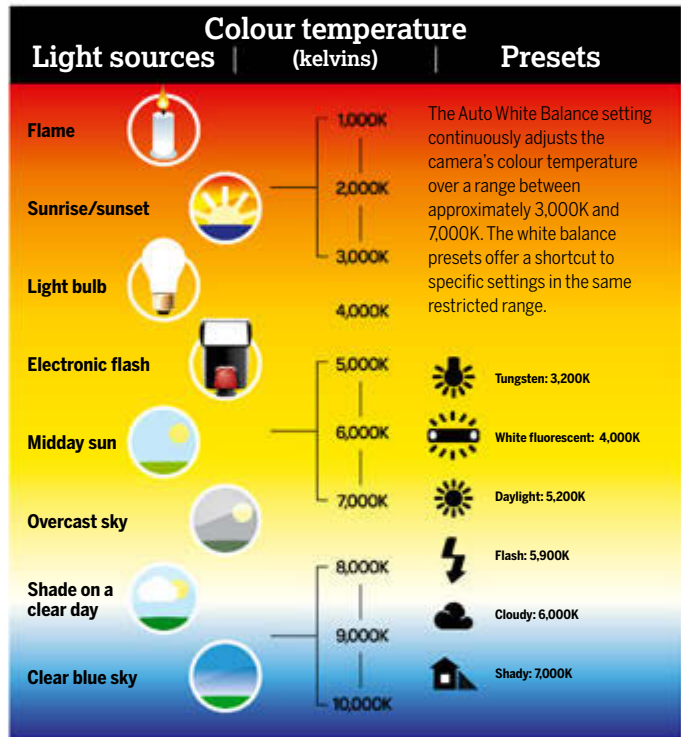
(as we've done above). Focal length and sensor size affect the maximum angle of view possible, and the angles of view illustrated here are for lenses attached to a full-frame camera. For cameras with smaller sensors, you need to take the sensor's crop factor into account, so for an APS-C sized sensor (called DX on Nikon cameras), you need to multiply the focal length by 1.5.

White balance

Learn how to remove colour casts from your pictures, or add them for creative effect

The white balance control enables you to adjust the 'colour temperature' of images. Light sources vary in colour temperature, which is measured in kelvins (K). At one end of the kelvin scale is the warm glow from a candle and at the other is the cool blue light seen in shadows on a sunny day. By adjusting the white balance, you can fine tune this colour temperature. It's called white balance because it enables you to ensure any whites in the image are rendered as 'pure' white. For instance, without a calibrated white balance setting, a sheet of white paper would appear orange when photographed under candlelight. White balance should really be called 'light balance', because the small icons you see when you scroll through your camera's white balance options all represent different lighting conditions. It's the job of the camera's white balance system to compensate for the colour differences in the lighting – so that the colours in the scene look exactly as we would expect them.

Your D-SLR has a wide range of options for controlling the white balance to suit the colour temperature of the light in the scene. However, your camera is supplied set to Automatic White Balance (AWB) – which will cleverly look after all this for you.



This AWB setting does a surprisingly good job of getting the colour of your shots right in most lighting situations. However, as with all your camera's automatic settings, it's not foolproof. Most importantly, it can only operate within a confined range of colour temperatures. Colour temperature is measured on the Kelvin (K) scale, and the AWB system can only adjust from around 3,000 to 7,000 K. It will struggle to get a picture that doesn't look all-over

orange when shooting in your front room at night, or when photographing a floodlit building (as the colour temperature of these light sources is lower). It will similarly struggle just before dawn or on a foggy day, when the light is blue-toned and requires a colour temperature higher than 7,000 K if you want to avoid blue-rinsed imagery. Your D-SLR, therefore, has a number of manual white balance options that allow you to take full control.

The colour wheel

Give your photos instant oomph by focusing on different colours and colour combinations in your compositions

Use warm shades with care

Cheerful yellows and oranges are classed as 'warm' colours. These have a big impact, and are best used in small doses. Tread with caution when using red – it has strong positive and negative connotations, signifying passion and love but also danger and sin. Blues evoke feelings of tranquillity

Primary colours

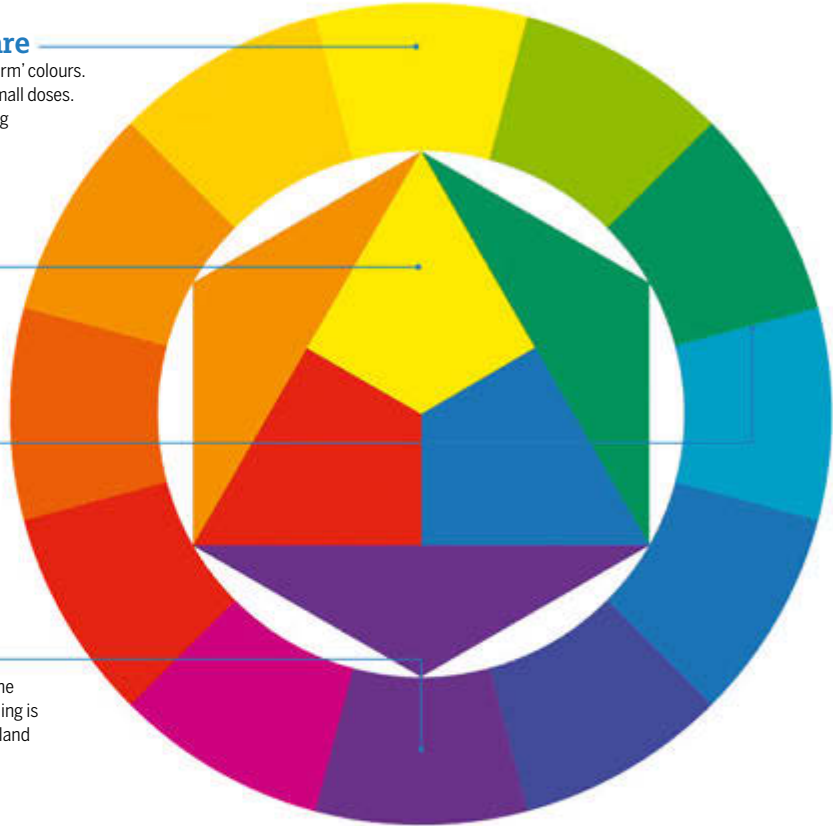
For a really strong effect try mixing primary colours (red, yellow and blue) to make a bright, bold statement

Restful hues

Matching together shades of 'cool' colours like blue and green creates an instantly calming effect. Or for instant contrast, mix a warm colour such as orange or red with a cool green or blue

Cultural Colours

Colour connotations vary around the world. In the western world, for example, the colour of mourning is black, but it's yellow in Egypt, and purple in Thailand



Most of us use colour in our photography without really thinking about it.

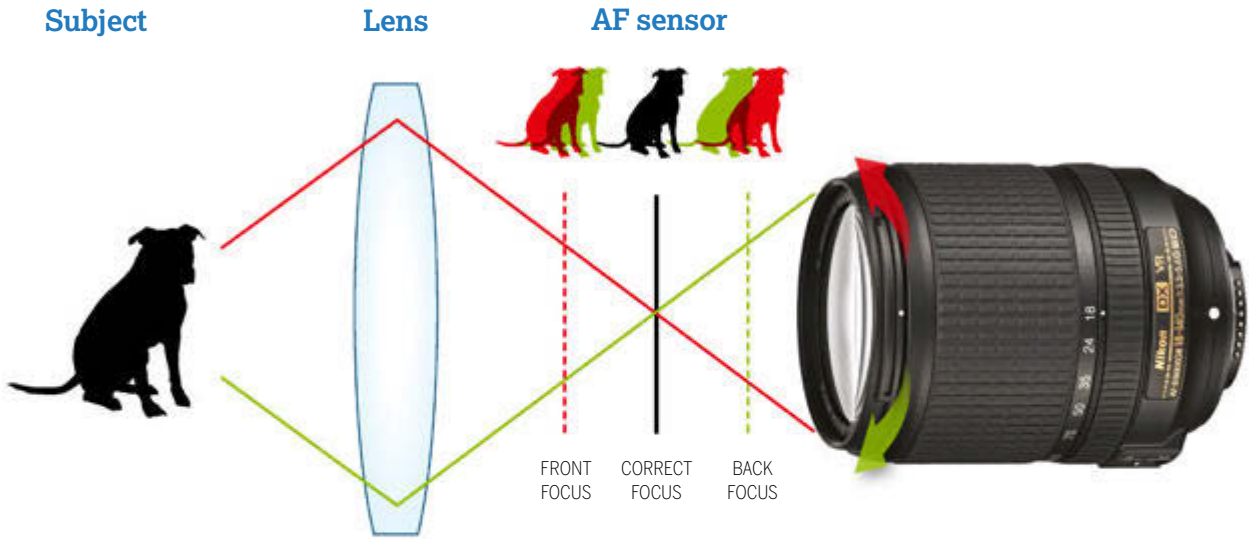
As soon as you stop and really consider which shades you use in your shots and how you match colours together, though, you'll see a drastic change in your photos. The most useful tool for experimenting with colours is the colour wheel. Used for centuries by

artists and designers, these rainbow circles show how different colours interact with each other. Primary colours (red, yellow and blue) are spaced evenly around the circle, with secondary colours (made by mixing primary colours together) falling in between. As a rule of thumb, colours that sit next to each other on the colour wheel work harmoniously together, and colours that are directly opposite each other are

complementary to each other. It's also worth keeping in mind when matching colours that different shades evoke strong psychological reactions in the viewer, and even small flashes of one colour can really change the mood and message of a photograph. Used correctly, colour is one of the easiest ways to create really dynamic, eye-catching shots. It's worth keeping a small colour wheel in your camera bag.

Autofocus

Everything you need to know about your camera's autofocus system, from how it works to how to use it



The phase detection autofocus sensor can detect how far out of focus a subject is, and whether the lens needs to focus nearer or further – it knows the correct adjustment before it focuses

Focusing is one of those tasks that sounds like it ought to be easy, but often it's not. In the old days, you simply turned the focus ring until the image looked sharp, or turned a ring on the lens to line up the index marker with a picture of some mountains, a group or a single person. But today's digital SLRs offer much higher levels of resolution, and the old techniques of guesswork and estimates aren't good enough any more. We want our photographs to be razor-sharp,

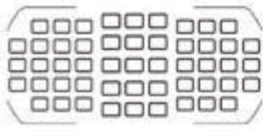
and for that we need the precision and speed of a modern multi-point autofocus system.

All these autofocus options can look daunting, but there's a simple way to look at them. First of all, you need to choose when your camera focuses – just once, when you half-press the shutter button, or all the time for as long as you keep the button pressed.

Second, you need to choose where in the frame it's focusing. Your camera offers you an array of choices, but you don't need to

know them all inside out. Once you've got the hang of what they do and why, you'll probably find you just use one mode for almost all your shots.

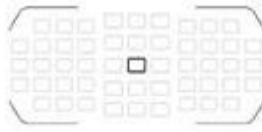
Your focusing options range from the clever and complicated Dynamic area AF modes to the perfectly straightforward single-point mode – choosing an autofocus mode is really only as complicated as you want to make it. See the diagrams on the right for detailed descriptions of the modes available to you.



Auto Area AF

Best for snapshots

In Auto Area AF mode, you're leaving it to the camera to decide what to focus on. It will check all its focus points and choose either the object nearest to the camera or, on later cameras, any faces the camera detects in the scene. This mode is a good fallback for novices, but the camera will sometimes focus on the wrong thing.



Single-point AF (51 points)

Best for precision

In single-point AF mode, you pick the focus point yourself. This gives the most control, provided you've got time to select the correct point (or you could use the 'focus lock' method). Single-point AF is ideal for relatively static shots where you've got a little more time to get set up.



Single-point AF (11 points)

Best for everyday

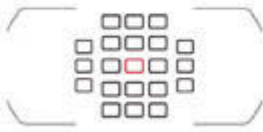
If you have a camera with a large number of AF points, you have a sophisticated autofocus system at your disposal, but it can take too long to select between them. On cameras with 39-point or 51-point AF systems, you can restrict the number of AF points to 11 for quick manual focus point selection.



Dynamic area AF (nine points)

Best for action

Dynamic area AF mode is designed to make the autofocus system more responsive and more reliable for moving subjects. You still select the focus point manually, but the surrounding AF points act as backups to keep the subject in focus if it moves briefly away from your chosen AF point.



Dynamic area AF (21 points)

Best for erratic action

You can include more AF points in Dynamic area AF mode. Nine points offers greatest accuracy if you can follow your subject in the viewfinder, but for subjects that move more erratically, the 21-point option may be more effective. Try out the options to see which best suits your subjects.



Dynamic area AF (51 points)

Best for tracking

You can use all the camera's focus points in Dynamic area AF mode. Some models offer 3D tracking, which uses information from multiple AF points to predict your subject's movement. This suits shots where you want to keep the camera framing the same while shooting a moving subject.

FOCUS MODES

What happens when you half-press the shutter button?

AF-S: SINGLE-SHOT MODE

This is the best mode for everyday photography. You half-press the shutter button (2) to activate the autofocus, the camera focuses once and then holds this focus until you press the button the rest of the way to take the picture or until you release your finger.

AF-C: CONTINUOUS AF MODE

This is the best mode for sports and action photography. As soon as you half-press the shutter button (2) the autofocus is activated, but it stays active all the time until you release the button or take the picture.

AF-A: AUTO MODE

AF-A mode will automatically switch between single-shot or continuous modes, depending on whether the camera detects subject movement. It's a reasonable fall-back for novice users, but it can be unpredictable and it's usually better to choose the mode yourself according to what you're shooting – this is the best way to make sure the camera is going to react predictably.

AF-ON BUTTON: 'BACK-BUTTON FOCUSING'

Pro D-SLRs have an 'AF-On' button on the back. This takes over the AF from the shutter release – it's a technique that sounds odd but makes sense when you try it. You can use it for single-shot AF, but it's more often used for moving subjects in continuous AF mode.



FOCUS
Press halfway

SHOOT
Press all the way

Hyperfocal focusing

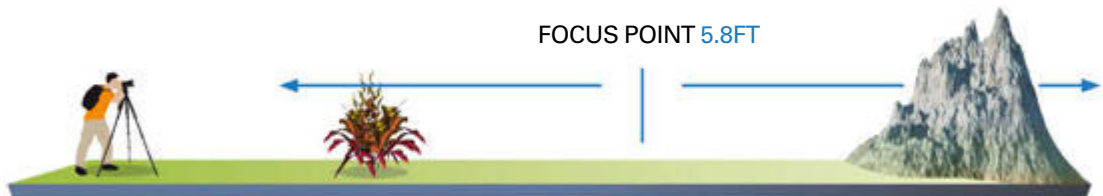
Discover how to calculate the best distance to focus at in your landscape photos



A Focusing on the foreground



B Focusing at infinity



C Focusing at the hyperfocal distance

Hyperfocal focusing is an old-school technique that helps you maximise sharpness in a photo. A camera lens can only focus to a single distance at any one time, but there's an area that extends from that point, both towards the camera and towards the horizon, where things still look sharp. This area is known as the depth of field. The depth of field isn't a fixed distance: several factors can make it wider or narrower, including the lens's

focal length and the aperture you set. The distance to which the lens is focused makes a big difference, which is where hyperfocal focusing can help. The hyperfocal distance is the point at which everything from half of this distance through to infinity falls within the depth of field, and so looks acceptably sharp. Shorter focal lengths and narrower apertures bring the hyperfocal distance closer to the camera, increasing the depth of field as a result. Longer focal lengths and wider apertures have the opposite effect, pushing the hyperfocal

distance back and decreasing the depth of field. Typically, the depth of field doesn't stretch as far towards the camera from the focal point as it does towards the background. Only about one third falls in front. This means that if you focus on an object close to the camera, you'll essentially waste one third of the depth of field. To fix this, you could focus further away, to sharpen more of the background but still ensure the foreground object falls within the depth of field. This is the theory behind hyperfocal focusing.

Digital processing

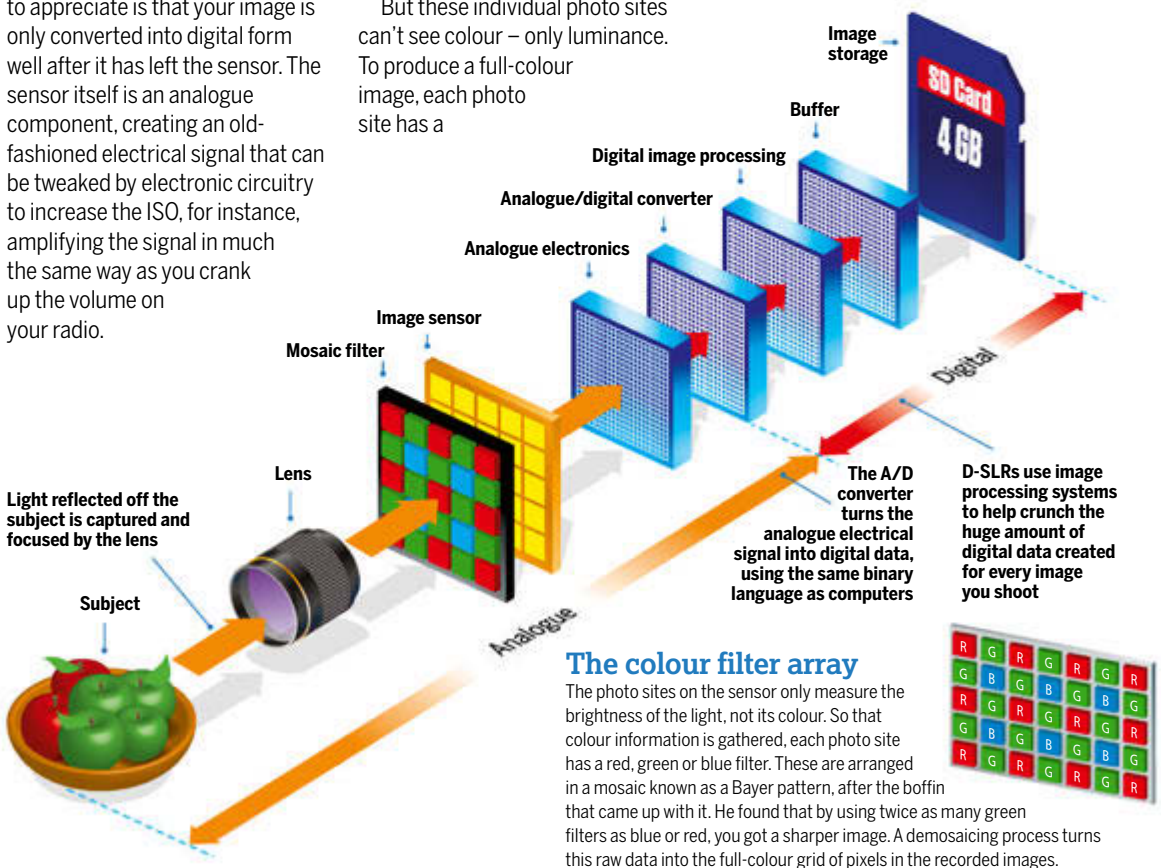
Your digital SLR might look like a film camera, but inside is the equivalent of a digital processing lab

Your digital camera does a lot more work to turn what you see in the viewfinder into a finished image than you probably give it credit for. Understanding a little of what goes on deep inside your camera's circuitry will help you understand some of the many options that you have to play with. Perhaps the most important thing to appreciate is that your image is only converted into digital form well after it has left the sensor. The sensor itself is an analogue component, creating an old-fashioned electrical signal that can be tweaked by electronic circuitry to increase the ISO, for instance, amplifying the signal in much the same way as you crank up the volume on your radio.

The sensor is made up of millions of light-sensitive units, often referred to as pixels, but more accurately called photo sites. These can measure as little as 0.004mm across (around 1/16th of the width of a single human hair). Each one creates its own electrical signal in proportion to the brightness of the part of the image that it covers.

But these individual photo sites can't see colour – only luminance. To produce a full-colour image, each photo site has a

miniature coloured filter, either red, green or blue. A pixel with a green filter will only see colours that have some green light in them. But as practically all colours can be made by mixing red, green and blue light together, this still provides valuable information. The clever bit is how the pixels work together to assign colours.



Studio photography

Discover how to set up a simple home studio and get professional-looking results

Backdrop

Most backdrops come in the form of a roll of paper. They're available in a variety of sizes and colours. You'll need support stands and a pole to keep the backdrop in place. If you don't have one, try a large sheet or piece of fabric. Black velvet is a great choice, it has light-absorbing qualities and gives a nice rich black

Hair light

The hair light is positioned behind the model with a snoot attached. The snoot concentrates the light, and here we've got it pointing at the hair. Not only does this light the hair, it creates a separation from the background

Main light

Use this with a diffuser, like a softbox. A softbox softens the light so the shadows are less harsh, and gives window-shaped catchlights in the eyes. The angle, height and distance of the main light are vital to getting the look you want. The power of the flash is controlled using buttons on the flash head

Model

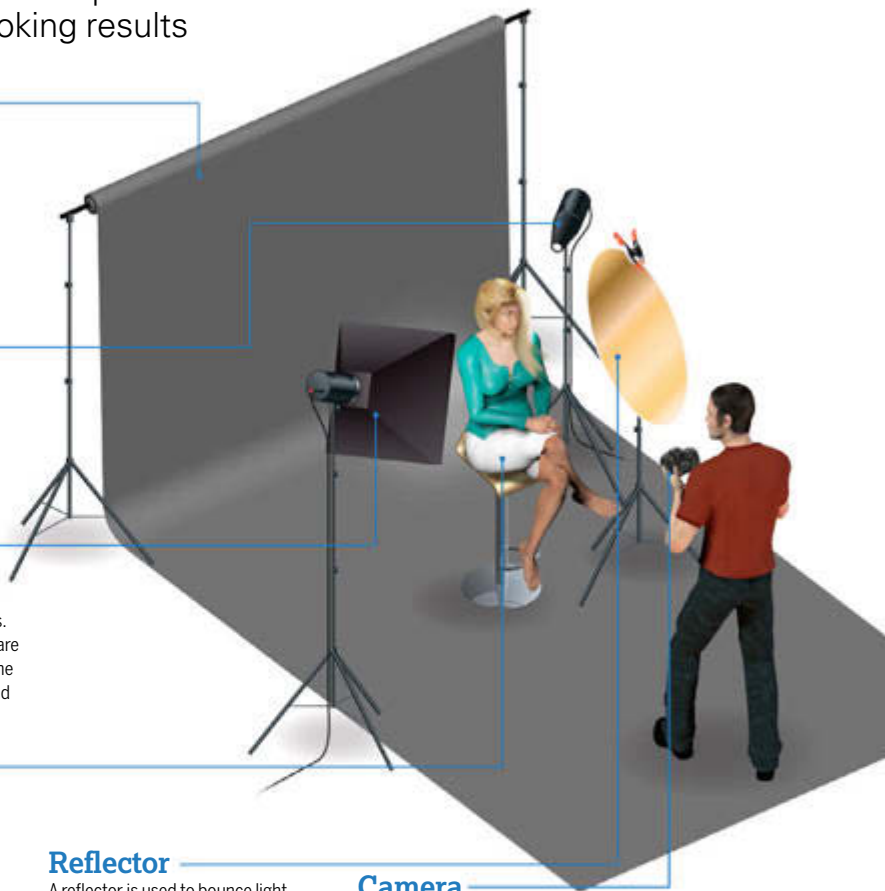
If you don't have a friend or family member you want to photograph, you can often find willing models via networking websites such as www.modelmayhem.com and www.purpleport.com. New models are keen to build their portfolios and increase their experience, so you can usually come to mutually agreeable arrangements – for a small fee or trading their time in exchange for use of your photos.

Reflector

A reflector is used to bounce light back from the main light into the shaded side of the subject's face. This ensures the shadow is still there to define the shape of the face.

Camera

You'll need to connect your camera to the studio lights. This can be done through a sync cable (if your SLR has a PC socket) or with wireless triggers. You're best off switching to manual shooting mode.



There's a lot of complicated sounding equipment that comes with studio photography, but don't get too bogged down with this. Our basic studio set-up above shows you

the essential items that you'll actually need. And all of it can be packed away into a small bag. When you're working with two lights, a reflector is still surprisingly useful because it will effectively act as a third light. It can

be used to bounce one of the existing lights back at the subject. If you're working outside with natural light, a reflector is extremely handy. Reflectors come in many shapes and sizes, and different colours and surfaces will

Flash head 1

Studio flash heads are much more powerful than Speedlights or other on-camera flashguns. They're powered either directly from the mains or by portable, rechargeable battery packs for location work

Lighting stands

You'll need stands for your flash units – they are included in most kits. You can adjust the angle of the flash with a locking knob near the top, and to change the direction, you just pick up the stand and turn it

Flash head 2

Most kits come with two flash heads: the first provides the main illumination and the second is used to provide fill-in light, background lighting or other more sophisticated lighting effects

Umbrella

This is another lighting 'modifier', and you should check to see what you get with any lighting kit you're considering. Some come with two umbrellas, others like this might come with a brolly and a softbox

Height adjustment

Precise positioning is at the heart of any studio lighting setup, and studio lighting stands are designed to make height adjustments quick and simple using tripod-style locking clamps.

Softbox

This is one of the more common light 'modifiers' you can use with studio flash units – you can see more examples in the Flash Modifiers box, right. This is what makes studio flash so powerful and versatile

FLASH MODIFIERS

These change and control the quality of the light



Softbox

A softbox produces a large, soft and uniform area of light that works well for portraits and still lifes



Honeycomb

This focuses the beam from the flash more tightly, and helps prevent light 'spillage' into other areas



Snoot

A snoot produces a very tightly focused beam of light that illuminates a small area for dramatic effect



White umbrella

You fire the flash through the umbrella for a soft light source, although there is some spillage



Silvered Umbrella

You fire the flash into the brolly to bounce it back towards your subject for a broad but crisp light

have different effects on a subject. Just like the studio lights, the height, angle and distance at which a reflector is positioned will all have an impact on the end result. Using nothing more than a simple two-head home studio lighting kit

you'll be able to create several studio set ups, from a classic Rembrandt to a more contemporary clamshell arrangement. These easy-to-arrange strobe combinations will enable you to take complete

control of lighting so you can go into a studio shoot with confidence. See page 20-21 for more information on how reflectors work, and on the effects on the model of the different colours available.

LIGHT POSITIONS

Choose where you want the shadows to fall



High

In most cases you'll want to have your main light positioned above the model. Notice how the shadow from the nose falls down the face, elongating the features. Ideally, you want the shadow of the nose to point towards the end of the lips. The triangle of light on the cheek on the shadow side is often referred to as 'Rembrandt' lighting; get your model to move her head to achieve this.

Eye level

With the flashlight to the side and at the same height as the model, the light falls across the face, causing a shadow that widens the features. If this light is balanced with one of equal strength on the other side, it can be quite effective, but as a sculpting technique, height would be better. Keep your flashlight's modelling lights switched on so you can see how the shadows will lie.

Low

There are unlikely to be too many situations when a low light is going to work well as your primary light source. It gives a spooky look, so Halloween is probably the only time you're even going to think about using this technique. As you can see from our example, it's not very flattering even on a young model. With underlighting, the nose shadow is clumpy and bags under the eyes will be amplified.

CAMERA HEIGHT

It's not just your subject that needs to know where to stand



High

Positioning your camera slightly higher than the subject's eyes can often produce a more flattering image. It generally creates a slimming effect. Notice how the neck recedes and the jaw looks more defined. But don't go over the top – go too high and your subject will look like they're in some strange yoga position.

Eye level

With the right lighting, eye level should be fine in most situations. Be aware that your camera height will affect how the portrait looks. Your camera's LCD screen will be vital in helping you assess this. If you're shorter than your subject, consider using a box or a step ladder to reach the right height, but be extremely careful!

Lying down

Generally, the lower you go with your camera angle, the less flattering the photo. It certainly won't make large folk look any slimmer. It does, however, create a striking effect and your subject will seem important. Corporate shots of business leaders are often shot from a low angle to create precisely this illusion.

CHAPTER 3



Creative projects

Over 40 inspirational images and the quick techniques you can use to recreate them



In this section

- 58 — Dramatic landscape
- 59 — Long exposure
- 60 — Abstract landscape
- 61 — Light trails in the city
- 62 — Spring flowers
- 63 — Fruit splash!
- 64 — Environmental portrait
- 65 — Natural child portrait
- 66 — Extreme macro still life
- 67 — Speeding car
- 68 — Solarised still life
- 69 — Polarised still life
- 70 — High-key flowers
- 71 — Frozen leaf
- 72 — Colour burst!
- 73 — Water drops
- 74 — Street candid
- 75 — Abstract cityscape
- 76 — Family portrait grid
- 77 — Abstract architecture
- 78 — Forest at dawn
- 79 — Woodland montage
- 80 — Wild deer
- 81 — Worm's eye view
- 82 — Garden birds
- 83 — Interior architecture
- 84 — Extreme close-up
- 85 — Colour grid
- 86 — Point of view
- 87 — Milky seascape
- 88 — Mono landscape
- 89 — Dewdrop macro
- 90 — Landscape silhouette
- 91 — Film-noir portrait
- 92 — Abstract art
- 93 — Monochrome plant art
- 94 — Firework display
- 95 — Star trails
- 96 — Classic moon shot
- 97 — Torch spirograph
- 98 — Toy train
- 99 — Focus stacked macro
- 100 — Flash portrait
- 101 — Surf action





Dramatic landscape

The weather is the driving force behind the mood and atmosphere of your landscapes, so here's how to make the most of it

The weather, lighting and subject are key to getting atmospheric shots, but nature sometimes needs a bit of help to achieve the most eye-catching results. Using filters such as ND grads can help you get more dramatic results, but there are also plenty of adjustments to make the most of the mood in your images. Dark and angry-looking clouds, along with shafts of sunlight and amazing colours, will help to produce dramatic landscapes. But capturing this drama can be a challenge. The rain and wind at the height of the

action can make it almost impossible to keep shooting, so you'll often find it easier to shoot just before, or just after, the worst of the stormy conditions. Even if you avoid shooting at the height of a storm, you're likely to have rain and wind to contend with when capturing more dramatic weather conditions. Make sure that both you and your camera kit are well protected from the elements.

A rain cover will help to keep your camera dry, but you'll also need to make sure that your camera bag is waterproof to keep the rest of your gear safe. A good waterproof coat and over-trousers will

help to keep you dry enough to wait for the worst of the weather to pass.

The fast-moving clouds that often accompany a storm are perfect for using slow shutter speeds to add some motion blur to the sky. Clouds appear to move at different speeds depending on their distance from the camera. Faster moving foreground clouds should blur more than those on the horizon. Even when the clouds are moving quickly, you'll need to use a shutter speed of at least 15 seconds. If you're shooting during the day, use a strong or variable neutral density filter.

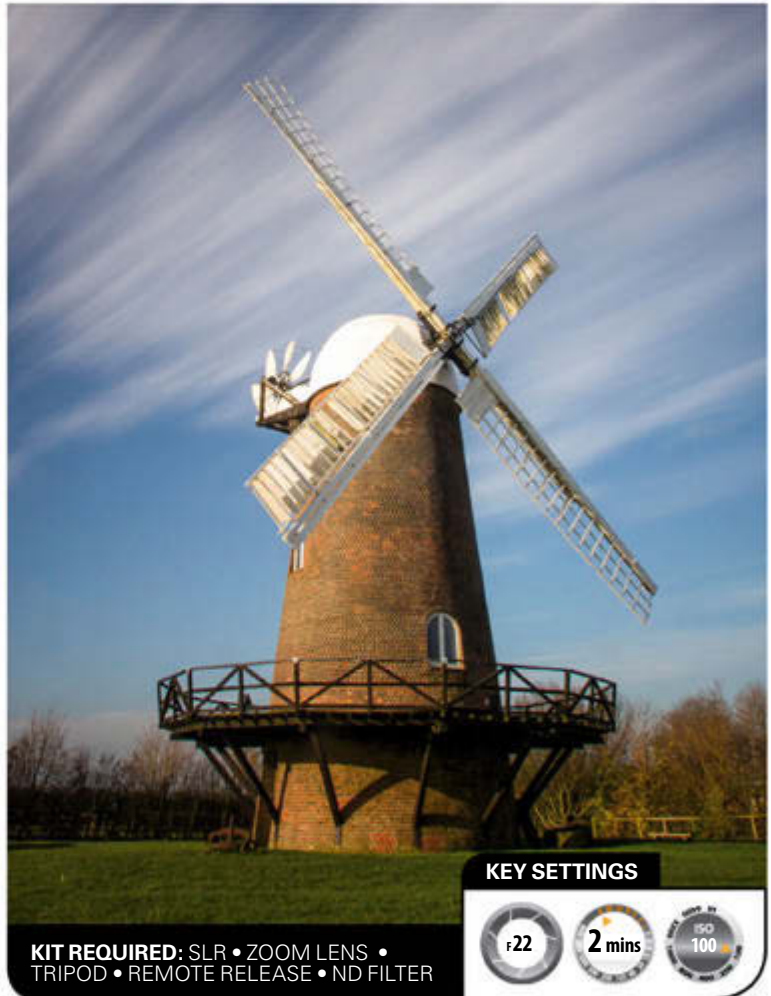
Long exposure

By restricting the flow of light into your camera, neutral density (ND) filters enable you to use longer shutter speeds

To shoot with the kind of shutter speeds you need to blur clouds, a tripod is essential. If, like us, you

opt to use a 10-stop ND filter, get your focusing and composition sorted before you attach it, then switch to manual focus. Take a test

shot without any filters attached to work out an initial exposure. Use manual mode, ISO100 and a narrow aperture like f/22, then adjust the shutter speed while keeping an eye on the exposure scale on the rear screen until your images are correctly exposed. We eventually settled on a shutter speed of 1/40 sec. Once your composition and focusing are spot-on, attach your ND filter to your lens. If you're using the filter in combination with a polariser, be careful not to adjust the polariser's rotation when you screw on the ND filter. With a 10-stop filter you might find you'll need a shutter speed longer than your camera's maximum setting of 30 seconds, so lower the shutter speed until it shows as Bulb mode. Attach a cable release to your camera too. This way, you can lock the shutter open for as long as you like and time the exposure manually. With Bulb mode set you can keep the shutter open as long as you like. Every stop blocked by the filter enables you to double the shutter speed, so increasing our 1/10 sec exposure by 10 stops gave an exposure of 100 seconds. We finally settled on 127 seconds.



In strong winds you might only need a shutter speed of a second or two to capture good cloud blur, and that can usually be achieved with a three- or four-stop ND



Abstract landscape

Master the camera-dragging technique to creatively blur a landscape scene and create an abstract work of art

The camera-dragging technique involves simply panning or dragging your camera across a scene – usually a landscape – while capturing a shot. By moving the camera with the shutter open you'll create an abstract painterly effect. The shutter speed and the speed of your pan will affect the outcome, so the technique involves a fair amount trial and error, but it's also a lot of fun! Choose a landscape that will offer lots of colour variation that you can capture as layers.

Set your camera to aperture-priority mode, and set the aperture to f/22. Set the ISO to 100, and set your lens to autofocus. In the middle of the day you may find you can't use a slow enough shutter speed without over-exposing your shots. If so, try dragging your camera faster, or use a neutral density filter to stop down the light. For the best results keep the shutter speed between 1/6 sec and three seconds. Alternatively, you can hold your camera for a more wavy and organic look.

A landscape location that offers lots of colours arranged in layers, such as a field or a beach, is best for this technique. Consider the time of year, and think about what will be on offer – golden cornfields and green grass make good results



Light trails in the city

Create stunning urban night scenes with a twist by combining a long-exposure with a zoom burst

You can capture wonderful urban images when the sun has gone down and the city streets are illuminated by a colourful array of lights from buildings, cars and street lamps. Night-time cityscapes lend themselves to all kinds of photographic effects, and for this image we shot two images using different techniques, then combined them in Photoshop. The first image is a long exposure of the scene, which captures light trails from moving cars. The second is a zoom-burst effect that will turn

stationary lights into colourful streaks, and which you create by rotating the barrel of your lens while the shutter is open. You'll need to find a good location, so head for a busy area that has lots of street lights and moving vehicles (avoid traffic jams). Try to get set up just after sunset, when the light is starting to change. There's about a 15-minute window when the sky has a bluish tint that will add colour, and looks great!

Set up your tripod next to a road, making sure that you're safely out of the way of oncoming traffic and bicycles. The light-trail effect works

best if you face oncoming traffic, so that the headlights are in the foreground of the frame. Set your SLR to manual shooting mode, and start with the aperture setting at f/10. Keep the ISO low, at 100, and set the shutter speed to 3.2 secs. These are good 'ballpark' settings, and you'll need to tweak them as required. As our shoot progressed, we narrowed the aperture to f/13, and dropped the shutter speed to 2.5 secs. Experiment with the timing, but you'll need to leave the shutter open for at least two seconds to capture the trails.

Spring flowers

Take wonderful shots of the delicate, sculptural spring flowers that pop up in your local parks and gardens

You don't need an expensive macro lens to get great shots of wild flowers in all their colourful glory,

especially if you don't mind getting a bit muddy!

If you're lucky enough to have a well-looked-after garden then you won't have to venture far to find a flower to practise on. Otherwise, stately homes, parks and public gardens will be bursting with colour in spring. You don't need any special kit for this project, but using a tripod will help make sure that your camera and backdrop is perfectly still, and will also mean that you really concentrate on your composition. Just like children, flowers look best when you photograph them on their level. Get parallel to your subject – you'll probably have to lie down to line up a good shot, so take a waterproof coat to avoid getting muddy.

You don't actually need a macro lens if you can get in close to your chosen flower. However, you will need to zoom in as close to your subject as your lens allows so that you can get a good composition without too much background. A wide aperture, such as $f/5.6$, will give you a shallow depth of field and knock your background nicely out of focus. Switch your mode dial to aperture-priority mode and adjust the aperture. Your camera will take care of the shutter speed itself, freeing you from having to fiddle too much with settings.



Sunrise will add a soft warm light to your images, and there will be less wind first thing, which will keep the flowers still enough to capture sharp images



KIT REQUIRED: SLR • ZOOM LENS • TRIPOD • REMOTE • FLASHGUN

Fruit splash!

Capturing the exact moment a falling object splashes into liquid can produce amazing photos – all you need is a little patience...

To get an image like this you need to freeze the motion of the falling strawberry at the split second it breaks the surface of the milk for a spectacular close-up splash. It's not an exact science. You might nail the shot on your first try or your hundredth, but that's all part of the fun! As well as the strawberries and milk, you'll need a tripod and a flashgun. Frontal flash destroys depth, and depth is exactly what you need in order to capture the contours of the splashing milk, so light the splash from the side by firing the

flash off-camera. You also need to make sure the flash duration is short, in order to freeze the motion without blur.

Mount your camera on a tripod and compose the shot, using a long focal length so you can keep the camera away from the spray of milk. Pre-focus on the spot where you intend the strawberry to hit by placing a small, heavy object in the milk, then focus on it and switch the lens to manual focus to lock it. Use a flashgun to light the scene, positioned to the left and angled down from above. You can trigger the unit using your SLR's

pop-up flash. First set the flashgun to act as a slave – this means it'll fire when another flash triggers it. Next open the pop-up flash, go to the Built-in Flash options in the Flash Control menu, and dial in a low manual flash power setting of 1/128. The pop-up flash will trigger the main flashgun, and act as a fill flash. Fire some test shots to determine the exposure. Keep the ambient light as low as possible by turning off lights and closing curtains, so the flash alone captures the action. When you're ready, drop the fruit and fire away!



Environmental portrait

Environmental portraits are photos of people in their everyday surroundings that ‘tell the story’ of your subject at work or at play

The aim of an environmental portrait is to include things that tell us something about the person, and the background becomes their ‘back story’, so you need to show details and objects that help to explain who they are and what they do. For this image we photographed a talented glassblower as he produced one of his beautiful and delicate creations. We began the shoot by taking some candid shots while observing the glassblowing process. Most of the work of shaping the glass was done on the bench, so this

is the setup we chose for the portrait, with the glowing furnace in the background.

When going into an unknown environment like this, it makes sense to start out by observing for a while, looking for interesting angles and details. Set your SLR to aperture-priority mode, and increase the ISO until your shutter speed is up to 1/200 sec or faster. Look for good spots of light, such as next to a window or door, and if the light isn’t right, add some of your own. After shooting a few candid, settle on a composition and set up an off-camera flash. For this image we positioned a flashgun off to the right of

the camera, and used the camera’s pop-up flash to trigger it.

You need a good line of sight, so make sure the sensor on the front of the flashgun is angled back towards you. The key with using off-camera flash is that rather than changing the exposure to suit the power of the flash, we change the flash power to suit the preferred exposure. So first set the camera to manual, and fire a couple of test shots without the flash to work out an exposure for the background. Then pop up the flash, and work out a power that exposes the subject correctly.



Natural child portrait

Photographing kids is challenging but rewarding. Learn how to capture the magic of children at play the natural way

Capturing the magic of an exploding smile, the emotion of a child in thought or the expressiveness of a mischievous grin far outweighs the risks of tears and tantrums. Forget about formal settings and posed shots. Those aren't the ideal situations for taking shots of children that also express their personalities. For a natural look, create a relaxed and casual environment in which children can simply play and be themselves, and while they're playing, capture some candid images. This is a great way to capture natural expressions,

and the children won't get so frustrated with adults pointing cameras in their faces or shouting at them to "say cheese".

There's an art to successfully capturing a real winner. You need to make sure you've got the right location for photography as well as for play, and that your camera and equipment is ready to go because the children won't wait for you to tweak your settings and setup. Natural light is the best, so try to create a shooting environment outside using available light. The settings you'll need are similar to those you'd use for shooting sports or

action. Use a fast shutter speed (such as 1/125 sec or faster). If you have to increase your ISO to 400 or 800, do so. A wide aperture such as f/2.8 helps you to achieve a fast shutter speed and creates a shallow depth of field, which will throw the background out of focus. Switch your camera's shooting mode to Continuous. Keep the button pressed to fire several shots in succession and you'll be more likely to capture a winner. It's usually a good idea to use exposure compensation. About half a stop overexposed retains light and detail in the shadows.



Extreme macro still life

To get close-up images of tiny subjects, you'd normally reach for a macro lens. But what if you want to get closer? Try reversing rings...

Reversing rings enable you to attach a lens to your camera the wrong way around, allowing you to focus at much closer distances.

They cost around £10 (\$15). There's no mechanical or electronic contact between the lens and the camera, so you lose autofocus, exposure metering (on most cameras) and any opportunity for the camera to control the lens aperture, so you need to use an old lens that has a mechanical aperture ring. Screw the reversing ring into the filter thread of the lens,

and then attach this combination onto your camera. Set the camera's exposure and focus to manual. If your camera has the facility, turn on the mirror lock-up mode to minimise motion blur. With the camera set up, fix it to a tripod and move it into place, close to a table. Position the subject. When you're shooting tiny things, you'll need to juggle the subject, tripod and camera a little in order to get the composition just right, so take your time. Depth of field will be tiny at such high magnifications so use an aperture of f/8.

To make it easier to position the lighting, use small lights. We used two small LEDs on moveable arms – you'd normally attach these to a laptop. To get the multi-coloured effect, we covered one light with a blue gel and the other with a red gel



Speeding car

Giving vehicle shots a sense of action doesn't always mean driving at speed. Take action-packed car images without getting out of first gear

With a little ingenuity and some simple techniques you can create the illusion of speed with the car

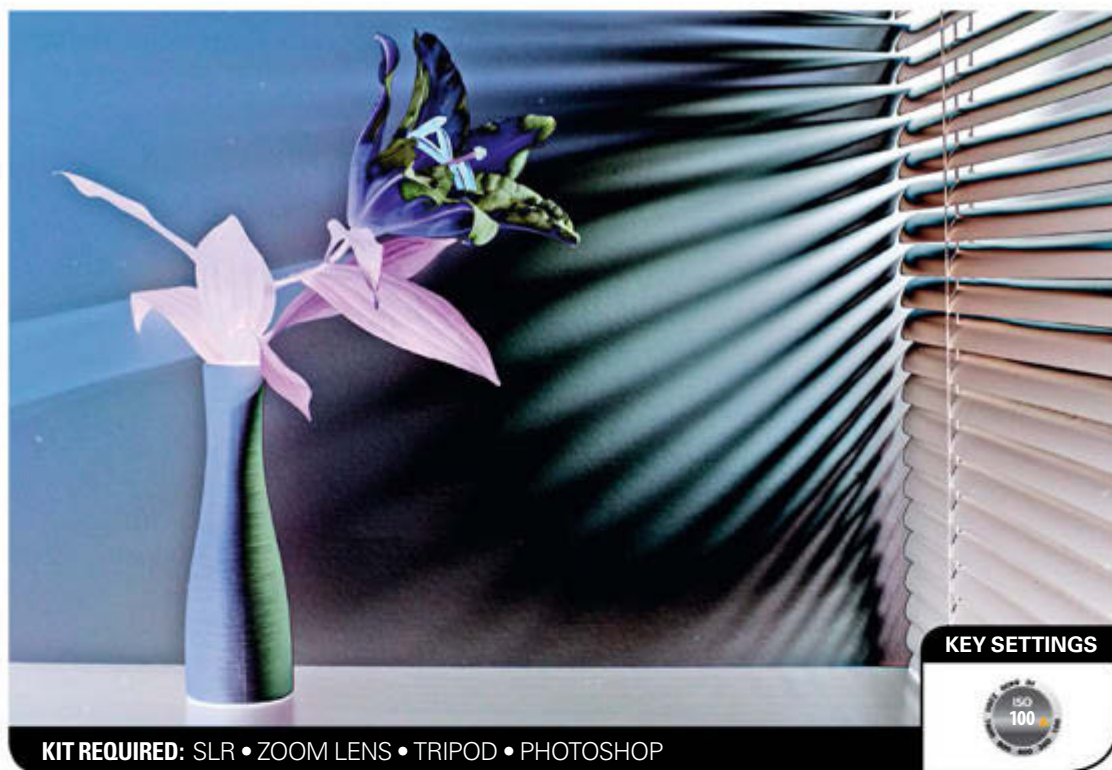
travelling at walking pace. This technique, known as a 'bolt-on', involves attaching the camera to the car and then using a long shutter speed to blur the background so that it looks like the car is travelling at speed. The first task is to find a safe location to take your shots.

You'll need a location where there aren't any other vehicles, such as a dead-end road. You'll also need a smooth surface, because any bumps will cause

the camera to move, creating the wrong sort of blur. Some objects fairly close to the car will create the right sort of blur and give a sense of speed.

Use a dedicated mount such as the Delkin Fat Gecko to mount the camera around 30cm from the car. You'll need to use a shutter speed of between one and three seconds to get plenty of blur, so before attaching it to the car, hold the camera roughly in position and check the exposure. If it's too bright you'll need to attach an ND filter to the lens to reduce the exposure. Once the camera is attached, check that it's totally secure.

Once you are happy with the set-up, get the driver to move the car slowly and smoothly while you fire the camera using a remote. You can trigger the camera from a distance, but try to stay close to the car to keep a watch on the camera and mount for any movement or loss of suction. Once you've got some straight shots, try different effects. You could set the camera at an angle to get a more dynamic composition. Also, if you have space around the car you can shoot when the car is turning to give a curved shape to the blurred background.



Solarised still life

Getting an inanimate scene to look interesting can be difficult. Make stylish images by mimicking colour solarisation

Solarisation was one of the first special effects in photography, being recognised as early as the 1840s – but now it's easy to do. It adds interest by giving the tones an almost negative and metallic look. The process is simple: take your shot, then adjust the Curves in Photoshop to flip the tones.

Open your image in Photoshop and create a new Curves adjustment layer. Create a point at the centre of the line and move this up to the top of the curve, then

grab the highlights point at the top right of the Curve and drag this right down to the baseline so the Curve forms an arch rather than the usual diagonal line. Flatten and duplicate the layer using Cmd/Ctrl+Alt+Shift+E, then invert it using Cmd/Ctrl+I to create a negative. At this point it might look a little flat, so to improve the tones go to Image>Adjustments>Shadows and Highlights and boost the shadows to lighten the tones. Finally, tweak the Levels to boost the colour and tone further.

When it comes to still lifes, lighting is key. Even, flat lighting will pick out all your subjects' tone and texture, but it can create a dull image. Solarisation was one of the first photographic special effects, and it can give your photos real oomph!



Polarised still life

Polarising filters do more than just darken blue skies. You can also use them to cut through reflections...

Polarising filters are often used to enhance blue skies, but this is only one of their uses. The light reflected from smooth and glossy surfaces is 'polarised' too, and you can use a filter to cut through these reflections to show what's beneath. This is really useful if you need to shoot objects that are displayed behind glass. Set the camera to single-point AF mode, and use the multi-selector to choose the best focus point within the scene. Make sure the camera isn't

focusing on the reflection in the glass rather than the object behind it. Your best chance of avoiding this is to make sure you set the focus when the polarising effect is strongest, not while you can see glare on the glass. Turn the polarising filter while watching the image in the viewfinder. You'll see the reflections in the glass grow fainter and disappear altogether. Tiny adjustments make all the difference, and it's worth taking a few moments to check you've found the optimum shooting angle.

Polarising filters come in different types, and it's important to get the right one. You can get older, simpler 'linear' polarisers, but they're not suitable for digital SLRs because they interfere with the AF systems, so make sure you get a circular one

High-key flowers

Let your highlights blow out to pure white with this refreshing and unusual take on floral photography

Capturing the perfect exposure with detail in highlights and shadows is an aspiration that many photographers become obsessed with. While there are many instances when it's an admirable goal, sometimes you just have to let them go and revel in the sumptuous rich, black shadows or beautifully blown highlights.

One look at this image on the SLR's rear display revealed a mass of flashing red clipped highlights. However, once the raw file had been processed, the light, airy tones and mass of clipped highlights took on a beauty of their own. Combined with a shallow depth of field, the result was a light and ethereal image in which the delphiniums appear to be almost dancing in the light. It's not a difficult technique to master, either – with this image it was just a matter of overexposing the shot.

Set up a small vase of flowers against a window. Any flowers and plants will work, but look for something with petals that have a lovely translucent quality, which will help to create the light and airy feeling in the shot. Switch your SLR to manual mode and use a wide aperture such as $f/2.8$ to create a shallow depth of field. You'll need to blow the highlights, so choose a slowish shutter speed; we used $1/20$ sec. Don't panic when your highlight alert goes bonkers!



When processing your flowers, don't be afraid to take liberties. For this image we increased the contrast on the stamens of the flower so they became darker

Frozen leaf

Capture striking, wintry still lives through ice, and you won't even need to get your feet wet!

The vivid colours of autumn leaves are obvious photographic subjects. While the oranges, reds and yellows make for ideal landscape shots, the leaves that provide such amazing colour can easily be brought home for a more detailed photographic study.

For this project we shot a leaf in a block of frozen ice. Before you can take your photograph, you need to prepare your block of ice with a leaf embedded inside. Take a glass tray with no logo on the base, and stretch cling film across it – this will make it easier to remove the ice block from the tray prior to shooting. Fill it with boiled and cooled water to a depth of 3-4mm, then freeze it. Boiled water contains less oxygen, so you'll get fewer bubbles in your shot. When the water is solid, add your leaf and more cooled water, and freeze the whole lot again.

Once your ice has frozen, place the tray upside down in a basin and run some cold water over the base until the ice block drops out. Now you're ready to shoot. Put a macro lens if you have one on your camera, and use manual focus so you can focus on the leaf, not on the surface of the ice. If you want extra light to bring out details in the leaf, position a flash to the side of the block of ice. You can also try backlighting the ice on a lightbox to bring out the detail.

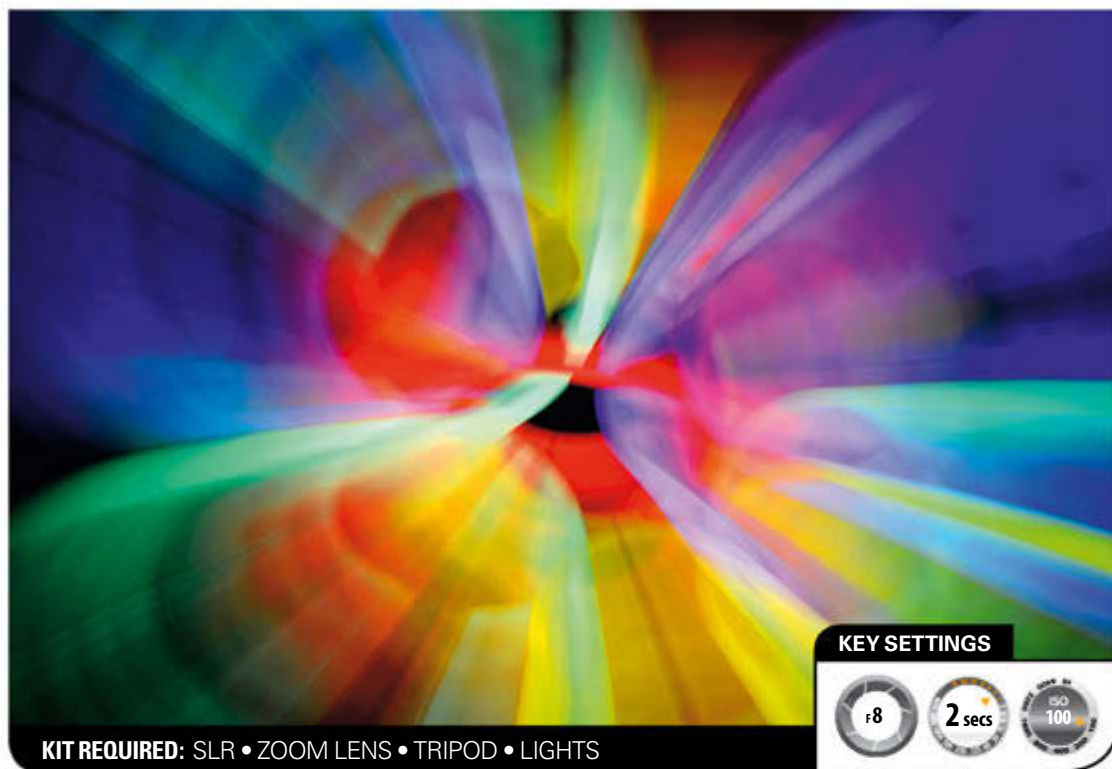


KIT REQUIRED: SLR • MACRO LENS • TRIPOD

KEY SETTINGS



Backlighting your leaf gives it a bright, translucent quality. If you don't have a lightbox for this, simply place your ice block against a window



KIT REQUIRED: SLR • ZOOM LENS • TRIPOD • LIGHTS

KEY SETTINGS



Colour burst!

Turning your lens's zoom ring while taking a long exposure of fairy lights can create a striking abstract zoom burst

For this project, all you need is a set of fairy lights or cheap coloured light sticks. The technique is just as simple, but the results can be amazing! Arrange your fairy lights or light sticks on a surface. Set your camera to manual, with an aperture of f/8 and a shutter speed between ½ and 1 sec. Make sure your camera is firmly attached to a tripod and face it down towards the lights. Use AF to focus on the lights, then switch the AF mode to manual and zoom the lens to the narrowest angle of view.

Take a shot while smoothly rotating the lens to the widest focal length. Check the results for exposure. Switching on highlight warnings is a good way to check for any burnout. When you're ready to take your proper shots, set the self-timer for two seconds and start to rotate the zoom ring just before the shutter releases, continuing the movement throughout the exposure. Adding a weight to the bottom of the tripod will help to keep things stable as you zoom.

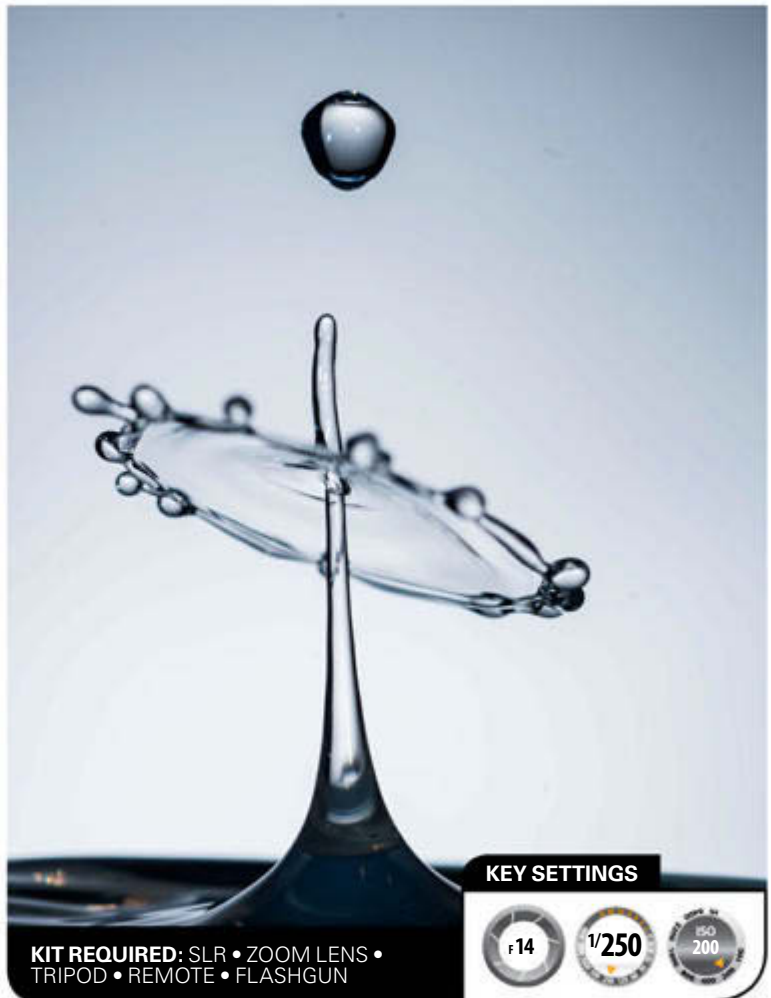
Time the rotation of the zoom ring to last through the full exposure for the best results, and try to rotate evenly. Hold the zoom for a split second after exposure starts for a different effect. Decrease the aperture if you need to use a longer exposure

Water drops

Discover the skills and techniques you need to freeze time and make stunning images of water drops in motion

Liquid can be a wonderful subject to shoot. With a little trial and error, you can create stunning results in no time. The basic idea here is to suspend a container of liquid and let drops fall through a small hole. The art is in capturing the splash as the drop hits the liquid below. It's the 'up-splash' that's most interesting, especially if it collides with a second drop. It's relatively easy to set this up with a home-made container that drips regularly. But we got our hands on the SplashArt Kit (£179 from www.phototrigger.co.uk), a helpful accessory that regulates the size and frequency of drops, and triggers the camera's shutter. We used water mixed with Xanthan gum to make a more viscous solution. Milk is also a good liquid to start with. For translucent liquids, you need to light the background.

The real art is in getting your timing just right; this can be frustrating and rewarding in equal measure. Use one or two speedlight-type flashguns set to their lowest power (usually 1/128). This will effectively give you the fastest possible flash exposure. For a transparent liquid like water, you should light the background; for an opaque liquid such as milk, light the subject. Switch to manual focus and use a marker to pre-focus on a point where the drop falls. Use a narrow aperture for maximum depth of field.



Timing is vital, whether you're using a trigger or a home-made rig. The trick is studying the timing of the drop, so you can better predict when to fire the shutter

Street candid

It may sound unintuitive, but often a candid snap can be best achieved when your eye isn't up against the viewfinder...

The standard tropes of framing mean classically captured images can seem too traditional – even

clichéd – when it comes to street photography. Taking a shot from a slightly unusual position, such as when your camera's at chest height or down by your hip, has the dual benefits of a creative angle and catching a subject unawares.

Not looking when you're taking a picture doesn't mean simply firing the camera and hoping for the best. Shooting from the hip is all about capturing candid shots without people noticing. The technique involves being discreet, which is why a wide-angle lens is necessary – an image can be shot with fairly loose framing and still capture the subject. A wide-angle prime in the 24mm–35mm range is best, to avoid any distortion – and ideally with a focus range display. This is so you can use manual focus rather than autofocus, because the latter can take a second or so to react. Hang your camera on its neck strap so it balances on your chest. Hold the grip as if you're looking for a subject to capture, but haven't found it yet. Point the camera up slightly, and use your peripheral vision to catch a subject walking past. In aperture-priority mode, set an aperture of around f/8 or f/11 to ensure that subjects closer or further than four metres will still be tolerably sharp. The camera will then set the shutter speed for you.



Walking around town while shooting incognito takes practice, and can be derailed by taking too many shots at once. Bursts of one or two seconds are best



Abstract cityscape

An overcast sky over a city makes for a boring, ordinary photograph. Here's how to turn a dull cityscape into an intriguing urban scene

You can make striking urban abstracts by taking multiple photos, changing the angle of view slightly for each one, then bringing them together in Photoshop. This method will produce an angular, patterned image, with repeated straight lines, reminiscent of the early Cubist style. When picking what to photograph, avoid overly complex areas. Straight lines work best, so look for plain buildings. Trees will be difficult, because they usually look blurred when merged. Grid-style architecture, such as blocks of apartments and offices, will replicate

effectively. Getting up high enables you to look down on buildings. Make use of angular structures; something with lots of straight lines such as a tower block or car park might not seem like an exciting subject, but will be perfectly suited for this project.

Take a sequence of shots while moving the camera. Capture the images close together and try to keep your motion even. Moving diagonally is best because it shows the variation in angles both horizontally and vertically, and it's better to move the camera rather than step to the side. Download your images, select

them in Bridge and go to Tools> Photoshop>Load File into Photoshop Layers to place all your images into one work space. Select your images in the Layers panel by clicking the top frame, holding down Shift, and then clicking the frame second from the bottom. Next, adjust the Fill and Opacity sliders at the top of the Layers panel. The more you do this, the more drastic the edit. As the layers pile up, details can blend together and look too bright. Create a Curves layer on the top by selecting the Curves icon above the Layers tab. Pull the line into an S-shape to increase the contrast.

Family portrait grid

Shoot a selection of expressive, action-packed portraits to produce a colourful and candid photo montage

Photo grids are a fantastic way of displaying a collection of portraits. You can download both grid templates and software for creating grids from the internet, but it's easy to create your own in Photoshop. Shoot your headshots against a plain background so that they're easy to cut out. Ask your subjects to wear brightly coloured tops – you can then choose backdrop colours to contrast with these. Talk to your subjects and make some jokes to put them at ease, so that you can capture more natural-looking shots. Set your camera to aperture-priority mode, and set the aperture to f/5.6 to ensure your subjects' heads and shoulders are in focus. Keep an eye on your shutter speed. Anything slower than 1/60 sec may result in blurred images. Get your subjects to strike a range of poses and expressions, looking in different directions, so you have plenty of options for your grid.

Open the images in Photoshop and use the Quick Selection tool to select the background. Go to Layer>New Fill Layer>Solid Color and click OK. Choose a colour from the Color Picker, then drag the Fill layer below the cut-out layer. Repeat for all 12 portraits, create a new document, and place the portraits in a grid pattern. Reposition and resize each shot as required once they're in place.



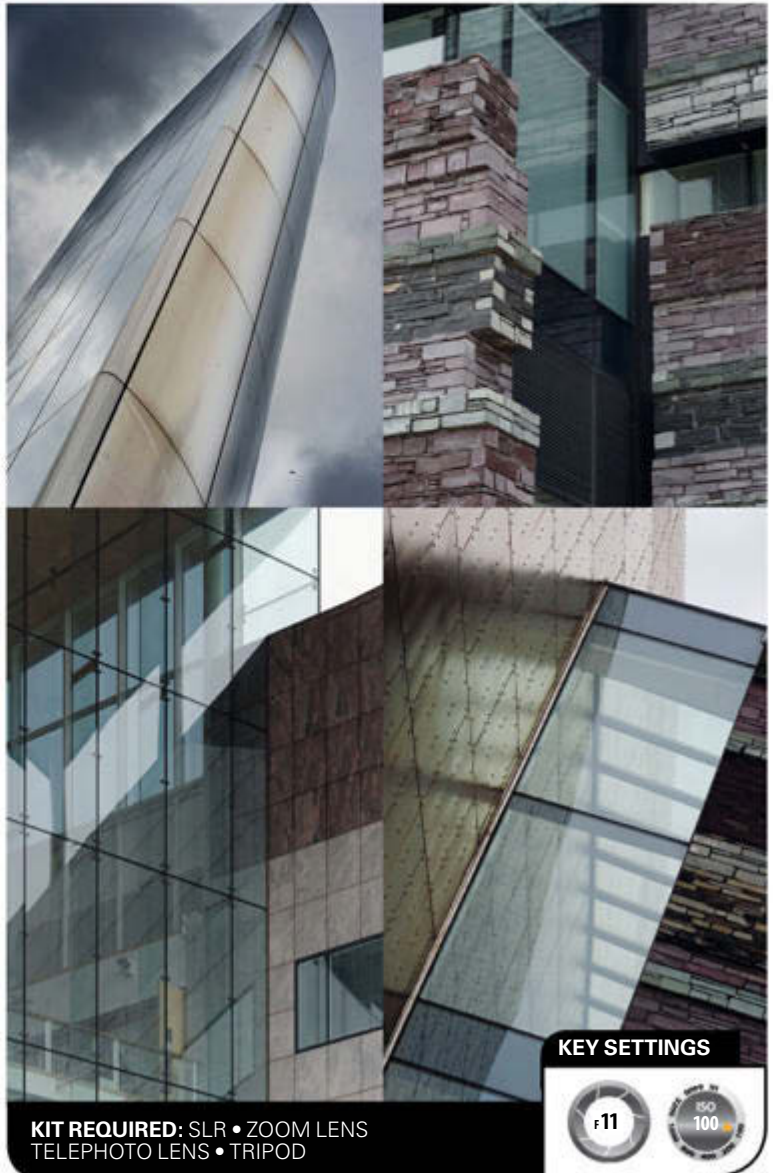
Abstract architecture

Discover the visual potential of modern buildings by looking at modern architecture from a different angle

There's no 'magic bullet' for abstract architectural photography. Some extra lenses will help, and you need a location with inspiring architecture, but most of all you need to be able to see lines, shapes and perspectives in a particular way. These shapes and lines are the real subject, not the buildings themselves. You can make a great picture out of something as mundane as a row of windows in a concrete office block. With abstract photography, it's not the subject itself that makes the picture, but the way you shoot it.

How do you train your eye to see interesting shots in details? This is where changing lenses will help. Use telephotos to shoot distant subjects, and they change the relationship between near and far objects. They alter perspectives, and they can make ordinary objects look very different.

You should also break the rules. Classical architectural photography rejects 'converging verticals', but in abstract photography you can turn these into a feature. You can use telephotos to make distant objects bigger, separating details in buildings from their surroundings so that any sense of scale or context is lost. Finally, the simplest compositions can be the most successful. A shot of a single detail can work really well.



KIT REQUIRED: SLR • ZOOM LENS
TELEPHOTO LENS • TRIPOD

KEY SETTINGS





KIT REQUIRED: SLR • ZOOM LENS • TRIPOD • REMOTE • PHOTOSHOP

KEY SETTINGS



Forest at dawn

Make an atmospheric forest shot by heading into the woods to capture the first light streaming through the canopy

You'll need to find a bit of forest where the canopy isn't too dense for a shot like this, so the sunlight can get through, and that has attractive ground cover.

You'll want a mostly clear sky, although if there's a bit of early morning mist, this will add some atmosphere to the scene. You need to check the sunrise time, and you need to know where the sun is going to rise, so you can work on your composition beforehand. Woodland scenes like this inevitably have very high contrast, and it's virtually impossible to capture the full range of

tones, from highlights to shadows, in a single exposure, so shoot three bracketed exposures, then combine them in Photoshop.

Find some woodland where the trees are closely spaced, but the canopy isn't too dense – tall pine trees are ideal, because the tall, thin trunks allow plenty of sunlight to get through. You'll need a tripod because you'll be shooting relatively long exposures, and because you'll want your images to align perfectly when you combine them. When you're shooting long exposures you need to

avoid touching the camera, because this can create vibrations that will cause blurred images. It's useful to have a remote shutter release to fire the shutter, but if you don't have one you can use the self-timer mode on your camera.

Set your camera to aperture-priority mode, and set the aperture to f/16. In addition to ensuring front-to-back sharpness, the narrow aperture also creates a starburst effect in the rays of sunlight, caused by light diffraction around the aperture blades in the lens. Keep the ISO at 100.

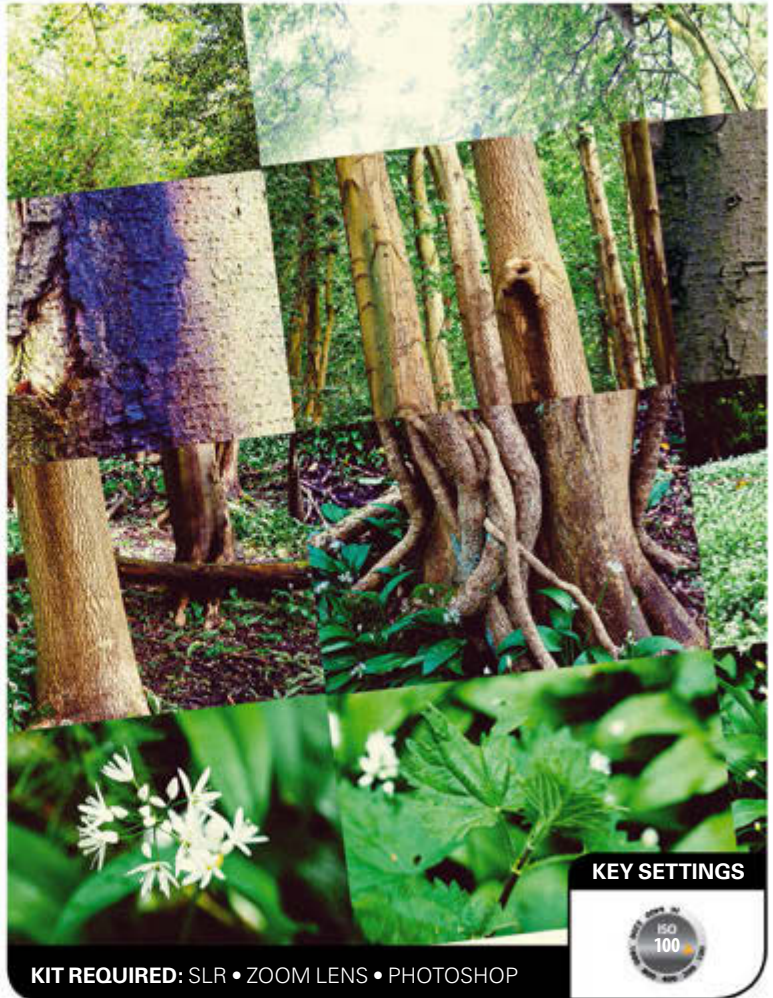
Woodland montage

Fed up with the same old way of shooting landscapes?
Why not look at new ways of spicing up your scenics?

More often than not when you go for a walk, you find your eyes darting all over the place. Perhaps it's a fleeting shimmer of light that catches your eye here, a gnarled old piece of bark that catches it there, or maybe just the beautiful hues of wild garlic carpeting a woodland floor. Whatever it may be, the chances are that you'll be soaking up all these little details subconsciously, and that they'll form your overall 'sense of place'.

Naturally, as photographers we want to capture this. Usually, we try to do it in one shot, skilfully choosing the perfect location at the ideal time when the light is at its most sublime. There's no denying there's an art to doing this, but it's not the only way to approach the challenge.

Why not look at new ways to explore the landscape with a camera? You could deconstruct it and make a beautiful composite of multiple glimpses of a wood. A 20-minute stroll is all you need. Keep your kit and settings simple, and don't get bogged down with tripods, filters or complicated techniques. Shoot anything that catches your eye in aperture-priority mode. Look for details high up in the canopy and low down on the ground, so you've got a range of viewpoints. When you get home, use Photoshop to combine the images in a grid.



KIT REQUIRED: SLR • ZOOM LENS • PHOTOSHOP

KEY SETTINGS



For this montage, the images are arranged from a high-to-low viewpoint in a 3x4 grid, but you can mix them up if they look better that way, or you could use a smaller grid



Wild deer

Capturing wildlife is a test of patience and dedication, and a chance to observe beautiful creatures behaving naturally

There's always an element of luck involved in wildlife photography, because you can never be sure that the animals will play ball, but with perseverance you can make your own luck. Wildlife photographers will visit the same location time and time again, waiting for the right moment when animal, light and composition all come together to create the perfect shot. It pays to be up and in position very early, because deer activity is usually most intense just after dawn. Of course, this is often

also one of the best times of the day for light, especially if you're lucky enough to get the magic combination of morning sunlight and low mist.

Wild deer get spooked easily, so stay downwind, wear dark clothes and keep quiet. Alternatively, head to a deer sanctuary or park where the animals are used to people. Here you can usually get in closer or use dedicated viewing areas. Ideally, you'll need a focal length of at least 400mm, and as a rule of thumb, your shutter speed should be at least one over the focal length of your lens.

Your position and camera angle are often dictated by the deer, but work the angles if you can. If the deer are lying down, you might be able to move around them and create interesting shapes with foreground and background detail

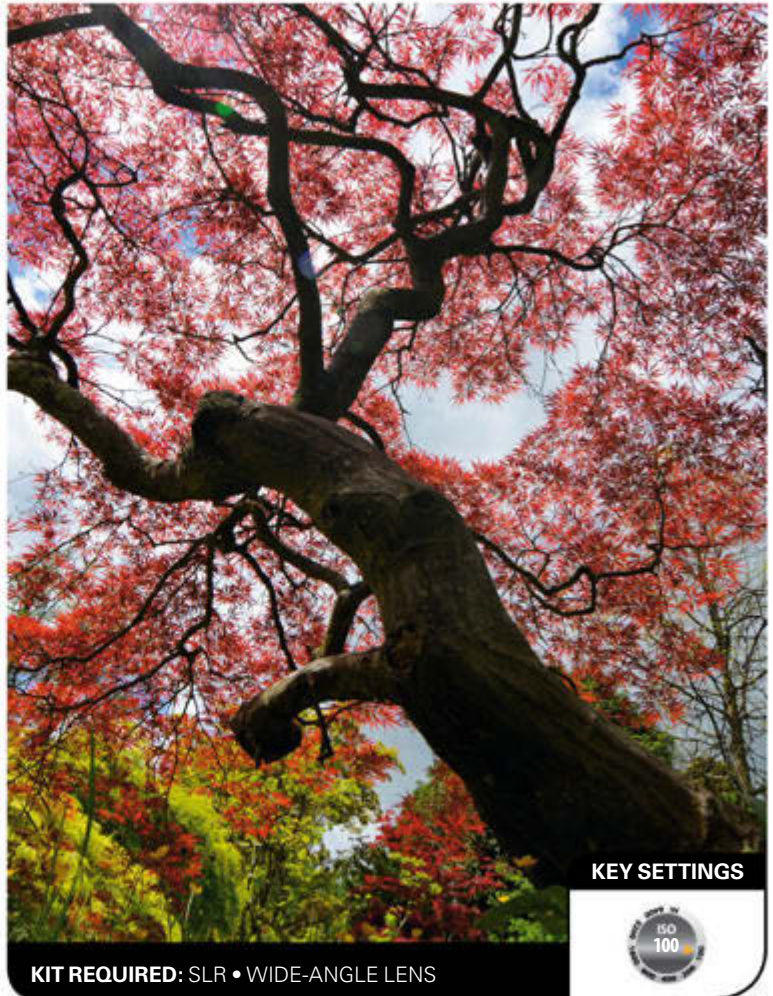
Worm's eye view

Get a unique view of the world by seeing it from a worm's-eye perspective using a wide-angle lens to widen the scope

Getting down as low as possible when you shoot gives a slightly surreal 'worm's-eye view' of the world. It's a quick and easy way to liven up your shots of flowers, buildings and even people.

You'll need to lie down for this technique. It's pretty difficult to frame up a shot with the eye-level viewfinder when you're flat on the ground, so switch to Live View (if you have it), so that you can use the main LCD to compose the shot accurately. If your camera has one, use the flip-out screen to make it easier. Fit a wide-angle lens, such as a 12-24mm. When it's used close up, a wide-angle lens will distort perspective for an even more dramatic look. Switch to aperture-priority mode so that you can concentrate on getting a wide aperture while your camera adjusts everything else for you automatically.

Clumps of flowers are perfect for attempting a worm's-eye effect. Look for lower ground to position yourself on, because lying a little below the flowers will make composition easier. Make sure you get your camera right under your subject and shoot at an upwards angle. Another method for shooting a worm's-eye view photo is by setting the self timer and placing your camera lens-up on the ground. This technique works really well with tree canopies.



KEY SETTINGS



KIT REQUIRED: SLR • WIDE-ANGLE LENS

If you're struggling to get a shot like this to work because your camera doesn't have a flip-out LCD, try lying on your back and shooting upwards

Garden birds

Capture our feathered friends at a distance with a long lens attached to a spotting scope

Normal 400mm or 500mm telephoto lenses aren't powerful enough to get close enough to many wild animals. However, digiscoping, where you attach your SLR to a spotting scope, can give an equivalent magnification to an 800mm lens or more. To do this you'll need an adaptor, which are made by many of the main scope manufacturers. Most adaptors have a 'universal' attachment that are available in a range of camera fittings. Spotting scopes don't offer the automatic functions such as focus or a variable aperture that you'd have with a telephoto lens, and the effective aperture of most is between f/8 and f/16, so you'll need plenty of light to use them effectively. And you'll need to use high ISO settings to get shutter speeds fast enough to prevent blur.

With no electronic connections, the range of exposure modes and metering using any adaptor is limited. On most cameras you can use manual or aperture-priority modes, and centre-weighted metering. In changing light conditions, aperture-priority mode is best. You can't adjust the aperture when using a spotting scope, but the automatic ISO setting allows your camera to adjust the exposure without relying on the shutter speed. Limit the ISO to 1600, and set the minimum shutter speed to 1/500 sec.



You'll have to use manual focus, and this can be difficult to judge due to the limited depth of field and the narrow maximum apertures of most spotting scopes

Interior architecture

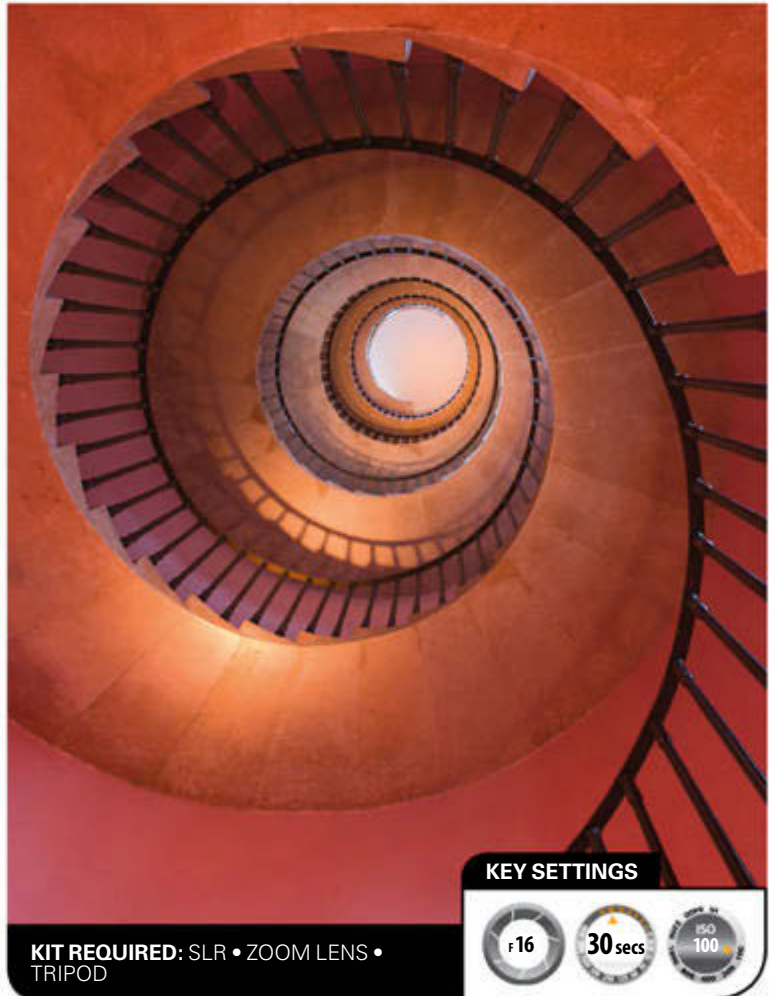
Shoot a spiral staircase from the bottom up to get this classic interior shot, then mix it up with a creative twist...

Spiral staircases have long been a staple of architectural photography. The graphic shapes create a sense of harmony, and provide a feeling of depth that leads the eye into the frame. Once you've nailed a traditional shot, however, why not give it a different spin?

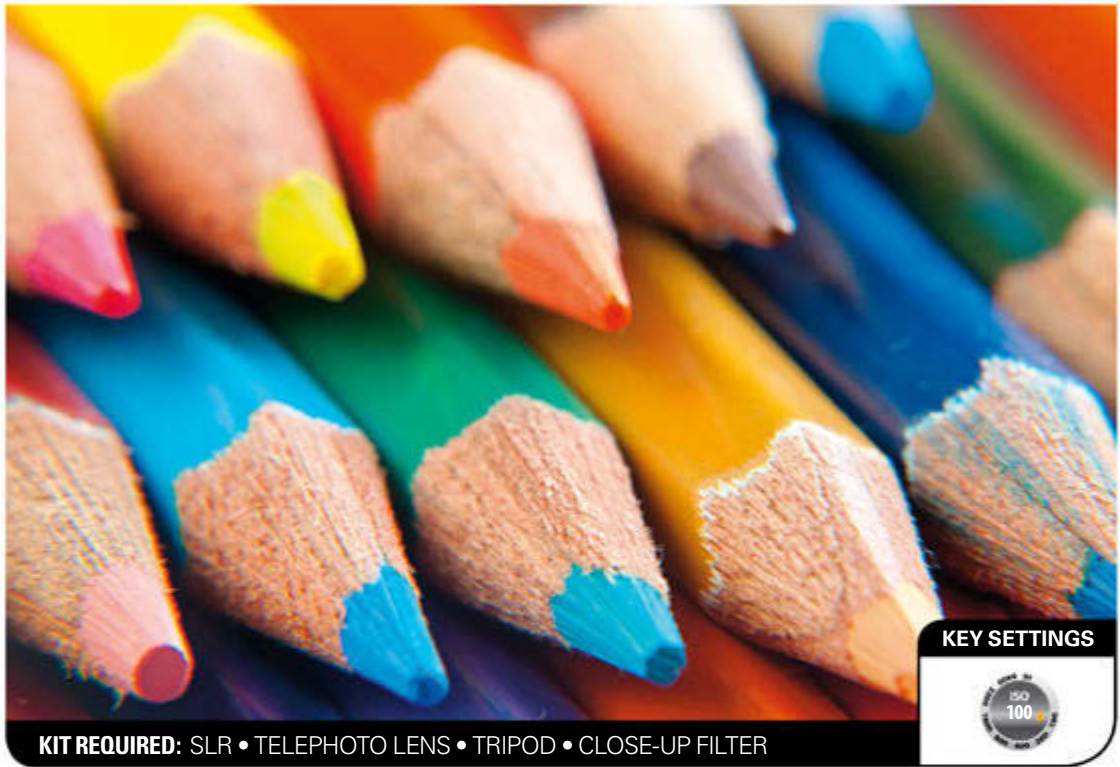
With most spiral staircases, the key is to get down low with a wide-angle lens, because this will maximise the number of spirals you're able to include. If there's enough light to shoot handheld, the easiest way to do this is to lie on your back and shoot straight upwards. For our shoot, it was too dark to shoot handheld, so we had to set up a tripod for the traditional shot.

We set up the tripod as low as possible (while still being able to peer through the viewfinder) and composed the image so that the banister swirled in from the corner. It was very dark, so we needed a shutter speed of 30 secs at f/16 and ISO100. Once we had that in the bag, it was time to experiment!

For the next shot we were able to shoot hand-held. Using a 24-70mm f/2.8 lens, we focused on the edge of the stairs nearest the camera and zoomed in while the shutter was open. We experimented with shutter speed, but settled on 1/8 sec at f/4 and ISO800. For the last shot, instead of zooming in while the shutter was open, we span the camera around!



If you try the spinning-camera method, take care to keep the spin as smooth as possible, and ensure it's centred on the middle of the frame



KEY SETTINGS



KIT REQUIRED: SLR • TELEPHOTO LENS • TRIPOD • CLOSE-UP FILTER

Extreme close-up

There are lots of ways to get your SLR really close to the subject. Here's a lightweight, low-cost method...

Close-up lenses (also known as a close-up filters) attach to the front of an existing lens, and work in the same way as a magnifying glass or a pair of reading glasses. They are both cheap and lightweight. They are available in different strengths, measured in dioptres. The higher the number, the higher the magnification, and the closer the minimum focus of the lens becomes. These lenses are often sold in sets with a +1, +2 and +4 dioptre lens. Two or more filters can

be combined to increase magnification – you just add the dioptre values together to get the resulting magnification. The optical quality of these filters is not as high as a macro lens – you tend to get more softening at the edges and more colour fringing. However, they are more than capable of giving you a different view of a miniature world. They can provide record shots of stamps, coins and jewellery, for instance – but can be used for artistic shots that show texture and detail that more distant shots fail to show.

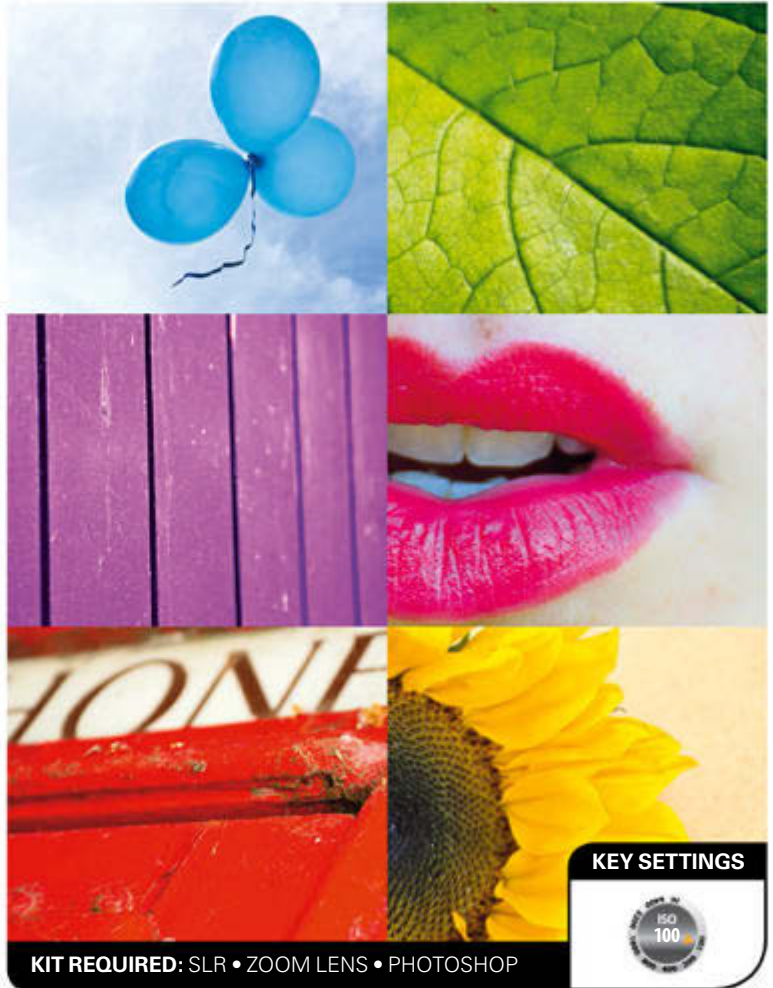
As with all close-ups, depth of field gets more limited the closer you get to the subject, and can be as little as a couple of millimetres. Use a tripod for stability, and try to keep the camera perpendicular to the face of the subject

Colour grid

Look at the world in monochrome and create vivid composite grids

Here's an assignment that will help you see the world differently! Monochromatic photos focus on just one colour, and they're a great way to create art prints. Simply head out with your camera and see what colours you can find. Urban environments are best for bright shades, but a country walk will give you the opportunity to mix different shades of one colour. Start with the obvious pops of colour – the veins in a green leaf make a striking subject, as does a brightly painted front door or a detail shot of someone's clothing?

The key is to look for unusual crops and detail, and to avoid including any jarring detail or different colours. If you've exhausted the bright colours in your immediate surroundings, why not set up your own shots? Balloons and flowers are ideal for playing with monochrome because they come in all shades of the rainbow. We batted pale blue balloons against a clear blue sky for a summery final shot. If your subject's natural background clashes with the colour you're focusing on, fake it with some coloured card. We popped an orange envelope behind a sunflower, for example.



A great way to show off the different shades and subjects you've collected is to edit them into a collage. It makes for a great print that tells the story of where you've been



Point of view

Give your travel and action photos a fresh perspective with a dynamic first-person point of view

Point of view or first-person shots are fun to photograph, and make great additions to your travel albums. They're also great for sharing what you're up to without taking a selfie. There's no need to invest in a GoPro sports camera – with an ingenious SLR accessory you can get brilliant images of your adventures. It's easy to get started. Shoot your hands and feet in different situations, such as patting a dog, dangling over a wall or buying an ice cream. At such close range, a super wide-angle lens is a big help for getting

everything in shot, but you could use your kit zoom lens at its widest zoom setting instead. Hands-free shots require a bit more preparation, but with the right equipment you'll be able to take a shot of yourself performing any activity at all.

Photographing your feet or just one hand is easy – you can simply point and shoot. If you want to include both your hands, hang your camera around your neck, switch to Live View and compose the shot, then use the self-timer to get your hands into the position you want. If you want to shoot sports then you'll need to keep your

camera stable. Get hold of an SLR chest strap, which wraps around your waist and holds the camera snug against you. They cost around £20 (\$35) on eBay, or you could make your own from some stretchy material.

The aim of a shot like this is to keep your hands in focus while the rest of the scene slightly blurs, creating a sense of speed. Switch to shutter-priority mode and pick a speed around 1/300 sec, then select the interval timer and start shooting. With a large enough memory card, you'll have plenty of shots to choose from.



Milky seascape

Expose your seascape shots for minutes rather than seconds to smooth out water and skies, producing dreamy images

Long-exposure photography enables you to capture fantastic images that would never be visible to the naked eye. Use the sturdiest tripod you have, and don't raise the centre column. It's best not to attempt this technique on a very windy day; if you do you'll need to shield your camera and tripod from gusts with your body, a building or a wall. Compose, focus and meter the shot without an ND filter fitted. With the filter fitted, so little light will reach the sensor that the camera will have problems focusing accurately. It's also a good idea to remove any

protective filters you have on the lens first, and make sure the front element and ND filter are clean. You'll often get more lens flare with filters, so use a lens hood or shade if you can, or try to 'flag' or shade your lens from any bright light with your hand or a piece of card.

Setting the ISO to 100 not only gives you the best quality, but it helps you to maximise your shutter speed. If you're using a zoom lens, then compose or work out the zoom setting before you focus. You can then autofocus on your subject and switch the lens to manual focus to keep it from refocusing, which

it might otherwise do when you fit the filter. Set the camera to manual exposure mode and choose the aperture for the depth of field you want. Now half-press the shutter and set the shutter speed to get a good exposure – you can always capture a test shot to check your settings.

When you're ready to take the shot, lock the shutter open with a remote release, time the exposure, then close the shutter. You may need to examine the histogram and optimise the exposure length for your particular filter, however.

Mono landscape

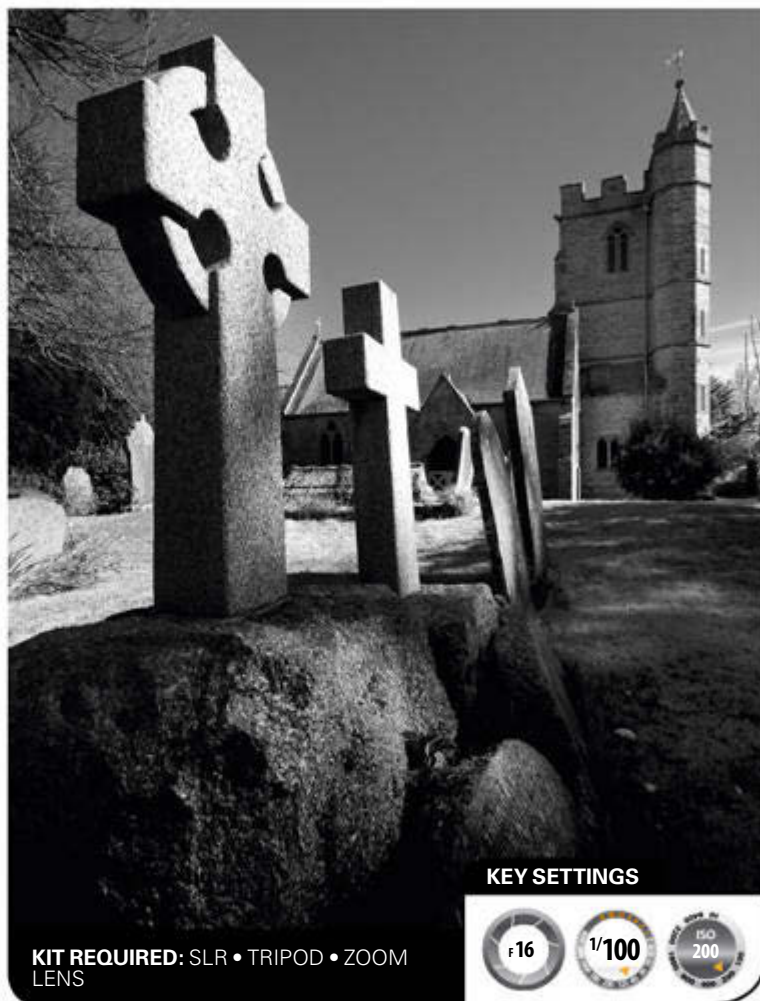
Bright sunny days can be perfect for mono shots. Here's how to create beautiful monochrome images in virtually any lighting

Shooting great black-and-white images isn't just about converting your images in Photoshop.

It starts before you press the shutter release. It's essential to set up your camera correctly for the best results and get a better idea of how the final image will look before you shoot.

Shooting black and white when it's bright and sunny may seem counter-intuitive, but there are plenty of reasons it's a great option. Bright sunshine creates strong shadows, which produce really striking black-and-white images. Similarly, fluffy white clouds against a blue sky can look stunning in mono. However, the high-contrast light produced by intense, direct sunshine means that you have to pay attention to your exposure.

In general, you should try to keep detail in the highlights, in the same way that you would when shooting colour images. One of the trickiest aspects of shooting in black and white is understanding how the colours in the subject will translate into different shades of grey in your final image. Selecting the mono Picture Style or Picture Control will give you the ability to see exactly how your shot will look. Once you've selected the mono Picture Style, you can preview how the image will look by using Live View, rather than an optical viewfinder. You can also review your images in black and white to give you instant feedback.



As well as strong graphic elements, the more subtle appearance of textures and tones can also help to add depth and interest to monochrome images

Dewdrop macro

Glistening raindrops add the finishing touch to macro flower shots. Liven up yours with drops of artificial rain

Shiny raindrops catch the eye, and act as miniature lenses that magnify the detail in leaves and petals.

There's no need to wait for a downpour to achieve the look – you can recreate this effect without getting your camera wet.

You can find a floral subject in your local park or buy a potted one. A macro lens will let you get in really close and capture minute details in the flower's petals, while maintaining a shallow depth of field for that dreamy macro look. A tripod isn't essential, but it will keep you steady and leave your hands free to create the effect you want. Use a watering can to create a falling rain effect, or mist petals with a hand sprayer for delicate dew drops.

Switch to the direct sunlight white balance mode if you're not shooting on a sunny day, because this makes plants look fresher. Also, use a low ISO to ensure a crisp final image. A shallow depth of field that blurs out the background works best, so pick an aperture of f/5.6 or wider. Position your flower against a clean background such as a grassy lawn. (Pick up any leaves or twigs that might show up in the shot.) Stay parallel to the flower and use Live View to check how the shot is looking. Make sure you focus manually on the rain drops to get them pin-sharp.



Add sugar to the water – this helps the droplets adhere to the flower's leaves and petals, and takes longer to dry, giving you more time to compose your picture



Landscape silhouette

Take a minimalist approach to your subjects and shoot into the sun to describe shape alone

Sometimes it's the simplest pictures that work the best. And in terms of composition and lighting, shots don't come any simpler than a silhouette. A silhouette is a subject that's been photographed with backlight so that you only show its outline. As the subject is thrown into shadow due to the position of the lighting, you can't see texture, you can't see its three-dimensional form, and you can't even see its colour.

To shoot a successful silhouette you first need to choose a subject

that can be identified by its two-dimensional shape. You need to photograph the subject from the right angle to accentuate this shape. A silhouette of a person, for instance, works better if you shoot the profile rather than shooting head on. For a bigger subject, such as a building, you'll need to hunt out the best angle to shoot from. Set your camera to aperture-priority mode, and use ISO 100 to avoid noise. Set a mid-aperture of around f/8. To darken the silhouette, dial in a setting of between -1 to -3EV exposure compensation.

To get a clear silhouette, you need a subject that can be isolated against a plain bright backdrop – it's much harder to get a silhouette of a building in a built-up area. They look more impressive when shot against a deep blue sky or a dramatic sunset



Film-noir portrait

Apply cool film-noir styling to a portrait using a few props and some simple tonal adjustments in Photoshop

With a few simple props and adjustments to tones in Photoshop, you can turn an ordinary portrait into something resembling a film still from the early twentieth century. This moody film-noir effect is done by converting the image to black and white, then making subtle toning tweaks. First, capture your portrait with your model styled appropriately, using a period hat and coat. Light the model using a 'gobo' to create the blinds effect.

A gobo is an object that comes between a light source and the subject that changes the characteristics of the light. You can buy one of these, or make your own out of cardboard. Load your portrait and go over to the HSL/Grayscale panel and click Convert to Grayscale, then set Oranges to +15 and Yellows to +30. Click OK to return to Photoshop. Make a new layer and grab the Gradient tool. Set the colour to black, and choose Foreground to Transparent. Drag in from the edges to darken them.

When retouching faces, it's useful to think of the face as a set of areas that each need a separate adjustment. For example, areas of skin might benefit from softening, while eyes could usually use a boost in sharpening and contrast

Abstract art

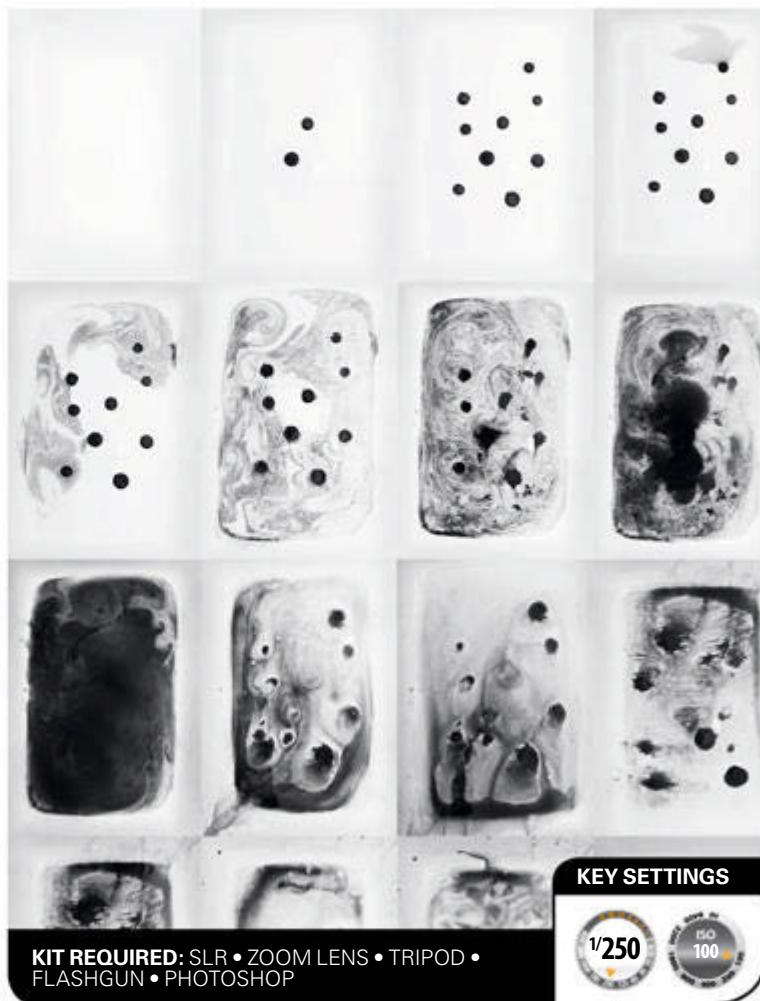
Drop ink or paint into an ordinary casserole dish to create an arty abstract masterpiece

Abstract art and photography have a close relationship. Since cameras were invented, painters and photographers have combined both media to create stunning results. If you're not much of a painter, don't worry: you don't need any painting skills to try out this simple project, only a little creativity and imagination to get the ball rolling. You'll also need to get hold of some black ink or paint and a white dish. Other essential items are a tripod, flashgun and a jug of water.

If you fancy a more colourful result, don't feel restricted to just black. Think of colours that mix well. For example, yellow and blue to make green, or yellow and red to make orange. For the final image, assemble the shots in Photoshop.

It helps to shoot a few extra shots so you have more to work with at the editing stage. It's also worth shooting in raw so you can batch-convert your images to black and white in Camera Raw, and also make any final tweaks to exposure and contrast.

Mount your camera on a tripod and frame the dish from a bird's-eye view. Place a flashgun next to the dish and angle the head up to bounce the light for an even distribution. Put your camera into manual shooting mode. Set the shutter speed to 1/250 sec and the ISO to 100, then balance the aperture setting with the flash intensity. Keep shooting as you add drops of paint, then a little water.



To process the images, open them in Camera Raw and convert them to greyscale, then create a new document in Photoshop and drop them into a grid



Monochrome plant art

Delight in delicate plant structures and make a striking monochrome triptych from common garden weeds and grasses

Sometimes the most simple approach can get you the best results. By stripping away distractions and shooting a subject against a plain white background, you can bring attention to the delicate designs of these plant structures. We used nothing more than a basic table-top studio with a clean white background, natural light from a north-facing window and a 50mm lens, although a standard kit zoom lens would be just as good.

Set up your camera on a tripod and put your camera into the portrait

orientation. Set up a clean white background behind your subject. We used the diffuser side of a reflector, but a piece of white card will suffice. Hunt for weeds and grasses that have interesting shapes and structures. Secure your subjects in front of the background, and you're ready to go.

Import all three images into Camera Raw. Click Select All to do a batch process. Boost Exposure to lighten and tweak the contrast in the images. Click Open Images when you're happy.

In Photoshop, add a Curves adjustment layer. Select the white

pipette. Click the background to lighten. Add a Black & White adjustment layer. Select Layer > Flatten image. Repeat for the other shots. Create a wide, thin new document, then make three equal-sized rectangles using the Shape tool in the document. Import the images into these shapes. In the Layers panel, move one image above each rectangle layer. Right click each image and select Create Clipping Mask, then position them as desired. Rotate them if necessary, but resist the temptation to resize them.

Firework display

Make your night-time fireworks shots go with a bang!
Here's how to capture a burst of multicoloured pyrotechnics...

Without the right settings, fireworks photos can end up looking blurry or smoky, but luckily, a bit of planning and technique is all that's necessary to learn how to get some really stunning final images. Trying to shoot displays that only last a few minutes can be chaotic in the middle of an excited crowd, so turn up early to scope out the location and find a good place to set up. Chat to the fireworks technicians if they are available when you arrive – they can keep you up to date on when and where to expect the action.

You'll need to pack a tripod to keep things steady. A long shutter speed is the key to great fireworks photos, allowing you to capture well-defined trailing lines of light and different bursts of fireworks in one dynamic picture. An ultra-wide lens like the Sigma 10-20mm is best, but a kit lens will do if you're not too close. Switch the mode dial to manual and set a low ISO, such as 100 or 200. If you use autofocus, your camera won't have anything to lock on to, so switch to manual using the button on the side of the lens and focus on a distant point before you start to shoot. Aperture is a case of trial and error, so start with f/8 and adjust for exposure as you go. A shutter speed of 1 sec will capture a single firework. Setting an exposure of 15 or 30 secs enables you to capture multiple bursts.



Setting a longer exposure of 15 or 30 seconds will enable you to capture lots of bursts in one picture, building up a dramatic pattern of multiple explosions



Star trails

Spend a night under the heavens with your camera and a remote release to produce an amazing star trail image...

Star-trail photography captures the drama of the stars' movement in what looks like an extremely long exposure.

The paths these heavenly bodies travel create long circular arcs in the night sky. Depending on your angle of view and lens choice, star trail photography can produce hundreds of arcs rotating around a central point in the scene. The best technique is to capture a large sequence of 'short' exposures, then merge them together in software.

A clear, cloudless sky in the countryside is best. Mount a wide-

angle lens on your SLR, and set your SLR on a tripod. Point your camera at the North Star, so that all the other stars spin around it. You'll also need a remote release to lock the shutter button down to set the camera for continuous multiple-exposure shooting. Shoot in raw for the best quality and for extra noise reduction, and choose manual exposure mode. Set a shutter speed of 30 secs, an aperture of f/5.6 and ISO800 as a starting point.

You can capture shorter trails in about an hour, so it's not necessary to

be out all night, but if you want to get really long trails, four hours or so is a good length of time.

Set your camera to manual focus and focus on a strong foreground subject with the stars behind. Take one or two images where you paint the foreground with torchlight.

When you return home, download Startrails from www.startrails.de/html/software.html and use this to assemble your star trail composite. Startrails handles both JPEG and TIFF files, but not raw, so you'll need to convert them first in Camera Raw.



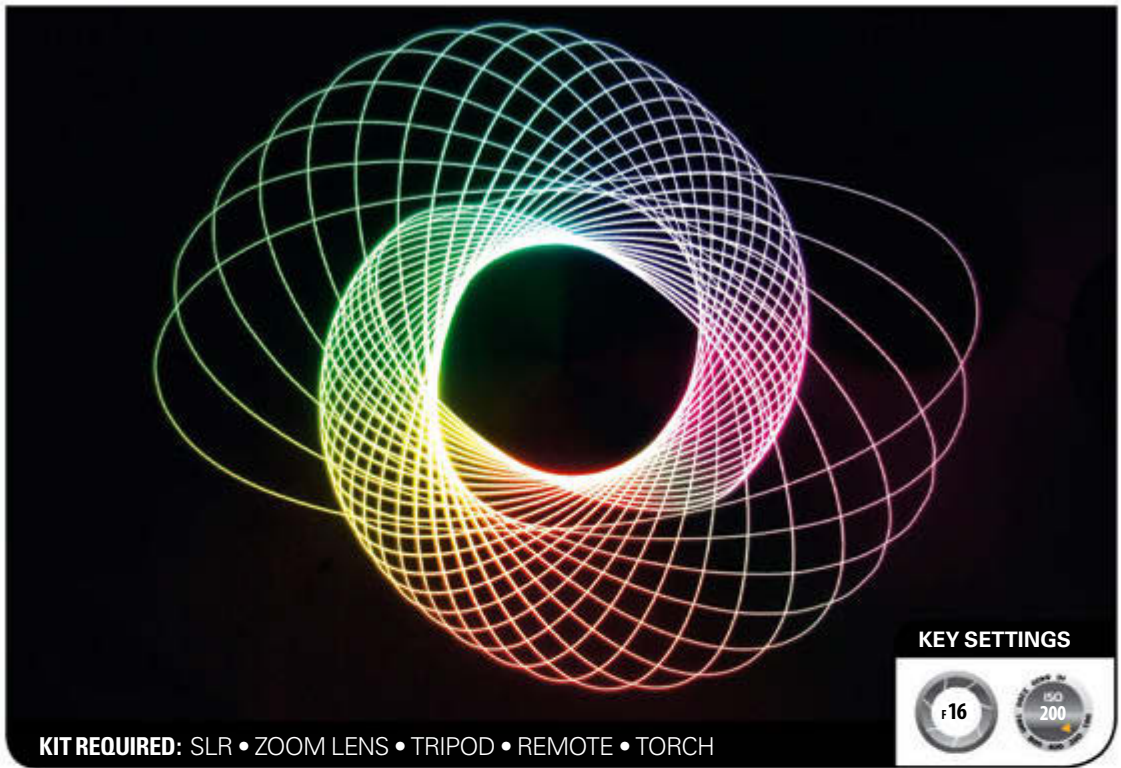
Classic moon shot

Moon photos leaving you blue? Get started with astrophotography with this guide to getting beautiful lunar pictures

Shots of what looks like a huge full moon to the naked eye can often end up showing a tiny white blob dotted on a black background, but it isn't complicated to set up your SLR to take a clear, well-defined shot of the moon. Check a lunar calendar to see which phase the moon is going to be in. Moonconnection.com will show you pictures of the moon according to which hemisphere you live in, so you can plan ahead. A zoom lens is essential for

capturing the moon's surface detail. A 50-500mm lens is ideal. A tripod will keep your camera still, and a remote shutter release will reduce shaking further – if you don't have one, set the camera's self timer to a few seconds in the setup menu. Switch your camera to manual mode and your lens to manual focus. When choosing your camera settings, there are two key factors to remember: the moon is bright, so a low ISO is fine, and it's actually moving slowly, so a fast shutter speed is called for.

The moon is, of course, constantly in motion, so you'll need to use a reasonably fast shutter speed to capture it in sharp detail. Switch to manual shooting mode and set a shutter speed of 1/200 sec. Set an aperture of f/10



Torch spirograph

Capture the movement of a swinging torch in darkness to create beautifully abstract physiogram images

Light trails can look really impressive, and are normally associated with shooting outdoors. But an equally impressive result can be achieved at home. Physiograms are geometric patterns that have been created and captured with a torch. The resulting image shows a light trail that takes on the look of a Spirograph drawing.

In principle, the technique is easy. Just find a darkened room, or wait for the night to draw in, and then use a long shutter speed to capture the movement of a torch. Due to the

shutter being open for a good length of time, the light from the torch is captured as a complete trail, enabling you to create patterns that are recorded by your camera.

Attach a piece of string to the end of the torch so that the light hangs down. Make sure the string is at least a metre long, and that it's long enough for the torch to swing in the position you've chosen. Using a drawing pin or tape, attach the loose end of the string to the ceiling. Test that the pin is secure, and that the torch can move freely. Cut a rectangular piece of paper or

card, ideally black and about 10cm long, and tape it to the side of the torch. This will allow for a much smoother arc. Changing the shape of this tail will alter the torch's path.

Set your camera to Bulb mode. Swing the torch, then press the shutter button and keep it held down to take a test shot. Release the button to close the shutter. Now check the preview. If the path looks dark, increase the ISO to 400 and try again. Still too dark? Increase the aperture to f/11. If it's too bright, reduce the ISO or decrease the aperture.

A fresh perspective is sometimes all that's needed to kick start your creativity and add interest and originality to your images

The off-shoot of this is that the perspective of the viewer is controlled by you, so you can have some fun with what they see by manipulating this perspective. For this project, we'll use the rules of perspective to trick the eye into seeing something in two dimensions that only actually exists in three. It's a simple, home-studio

Using masking tape, attach the tracing paper to your rear LCD and line it up so the image covers it; the backlit screen should shine through so that any test images are visible through it. Put your SLR on a tripod and then use a tabletop as your 3D canvas. Any lens will work, but a macro lens will provide a life-size reproduction of your setup. You don't need to be exact, but the end product needs to be recognisable or the effect won't work as well. Use aperture-priority mode set to around $f/16$, to get as much of the 'train' in focus as possible.



KIT REQUIRED: SLR • ZOOM LENS • TRIPOD • REMOTE • PHOTOSHOP

Focus stacked macro

Extend the depth of field on your favourite lens by shooting multiple images and blending them in Photoshop

Focus-stacking is a crafty photographic method that will help you extend depth of field in your close-ups. With macro photography, it's difficult to create a deep depth of field. Even with narrow apertures such as f/16, you simply won't be able to get an image fully sharp from front to back. The idea behind focus-stacking is to shoot a set of images (nine in this case) from exactly the same position, but with a different point of focus between each shot. You'll end up with lots of shots, but these can be combined in image-editing software to

create one super-sharp macro shot. Start by mounting your camera on a tripod. It's important you keep the camera in the same position throughout the sequence of shots, so you can easily edit them together. A tripod also enables you to shoot using a slow shutter speed, so you can keep your ISO setting low to eliminate noise. It's best to shoot in manual mode, so you're in complete control. When it comes to the editing stage later, you'll want your images to match up exactly, so it's best to keep the exposure settings the same throughout the shoot. Start by setting your aperture

to f/8. At this setting, you shouldn't encounter any diffraction issues. Next, set the ISO low – we had ours set to ISO100 – then balance the shutter speed to the other two exposure settings. Frame up your shot and fire away using a remote release, changing the focus setting for each exposure. To blend the layers and make your subject sharp from front to back, go to Edit>Auto-Blend Layers and select the Stack Images option. Photoshop will do all the hard work for you. It's best to flatten the image afterwards. We added a retro look using Curves and a Gradient Map.



Flash portrait

Use a flashgun off-camera to light your subject from any direction, adding drama to your portraits when shooting outdoors

One of the most creative things you can do with your flashguns is to get them off your camera's hotshoe and learn how to fire them remotely. Set manual mode on your camera and select a shutter speed of 1/200 sec or less (most flashes won't work at speeds higher than this). Take a test shot to work out the correct aperture and ISO for the ambient light – we set a shutter speed of 1/125 sec at f/2.8 and ISO400. The next step is to under-expose the ambient light, in

our case by decreasing the aperture setting to f/5.6. This gives a darkened image, which is, in effect, the base exposure for the image. From here, you can use your flashgun to pick out your subject. Attach the flash to a stand or tripod, or get someone to hold it – if your flash isn't triggered wirelessly by your camera's built-in flash, now's the time to attach your sync cord or wireless flash trigger. Set your flashgun to manual mode, then take a few test shots while adjusting the power. We used a flash output of 1/4 power.

Experiment by lighting the subject from different angles. We moved the flashgun behind the tree to backlight the model's fantastic hair. Combined with the dappled sunlight through the tree, the flash light looks entirely natural



Surf action

Get up close to the surfing action with a waterproof housing and take cracking watersports shots

Surf photography is fast-paced and fun, and it's easier than you might think to get action-packed shots. All you need is a waterproof housing. You could always stand on the beach with a zoom lens and get decent pictures of surfers, but if you want to shoot like the pros do, you're going to need to wade into the sea. Waterproof camera housings are specifically designed to keep your camera completely dry even when submerged in water, so you can shoot confidently while in the ocean. Pro surf photographers are most likely to be shooting big breaks on

the shores of Hawaii or Bali, but your local beach is fine for learning the basics.

Good surf conditions aren't guaranteed, so you'll need to keep an eye on the forecast and the size of the waves. Start off by standing in shallow water and shooting the surfers head-on, then get in deeper and shoot parallel to your subject. The key, like with any sports photography, is to get your surfer pin-sharp.

The lens you choose depends on how close you can get to where surfers are catching waves. We started out using a 70-300mm lens, standing in

the waist-deep water and zooming to 200mm to get up close to the subject. Remember, only change lenses on dry land! Set up your camera before you get into the water, because you won't be able to do much more than point and shoot once you're in the sea. Switch to program mode and set the ISO to 400 to make sure the shutter speed stays high and that you won't have issues if the light changes. When a surfer catches a wave you'll only have a few seconds to get a great shot. Improve the odds by switching your release mode to Continuous.



CHAPTER 4

Field guides

Learn how to shoot virtually
anything with foolproof step-
by-step flow diagrams

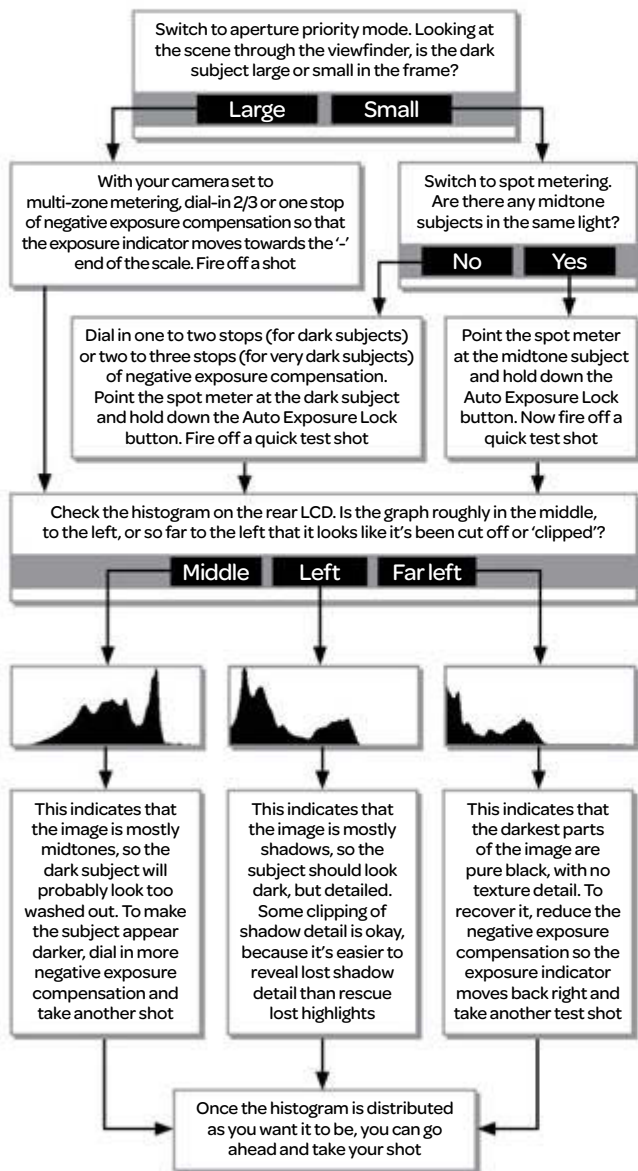


In this section

- 104 _ Metering
- 108 _ Focusing
- 112 _ Sharpness
- 116 _ Filters
- 120 _ Landscapes
- 130 _ Wildlife
- 134 _ Portraits
- 138 _ Architecture
- 142 _ Birds
- 146 _ Macro
- 150 _ Low light
- 154 _ Weddings

Dark subjects

Do your pictures of dark and black subjects look grey? Follow this flowchart to fix the problem



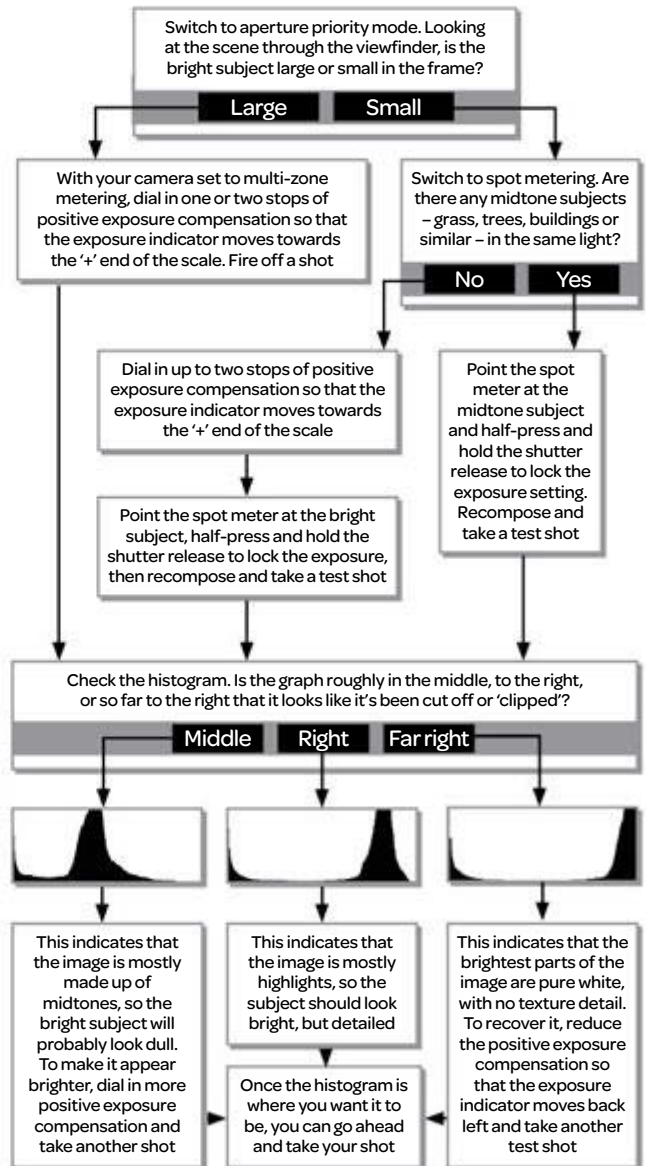
Aperture, shutter speed and ISO are the three building blocks of exposure, and the exposure meter inside your camera essentially brings them all together. The meter measures the amount of light in the scene, and then selects the combination of aperture, shutter speed and ISO to produce a balanced exposure. Most camera meters work on the assumption that a scene should be exposed as if it's 18% midtone grey. This is because it is generally considered that most scenes will reflect 18% of the light that falls on them. But in reality the world is not full of midtones.

Bright subjects

Follow these steps to ensure your shots of bright and white scenes look fresh and clean



Most current SLRs feature systems that can effectively boost dynamic range, such as Canon's Auto Lighting Optimiser and Nikon's Active D-Lighting, but there's no substitute for nailing the correct exposure setting. This is where the histogram comes in. This is a small graph that illustrates the range of tones in the picture, from shadows on the left to highlights on the right.

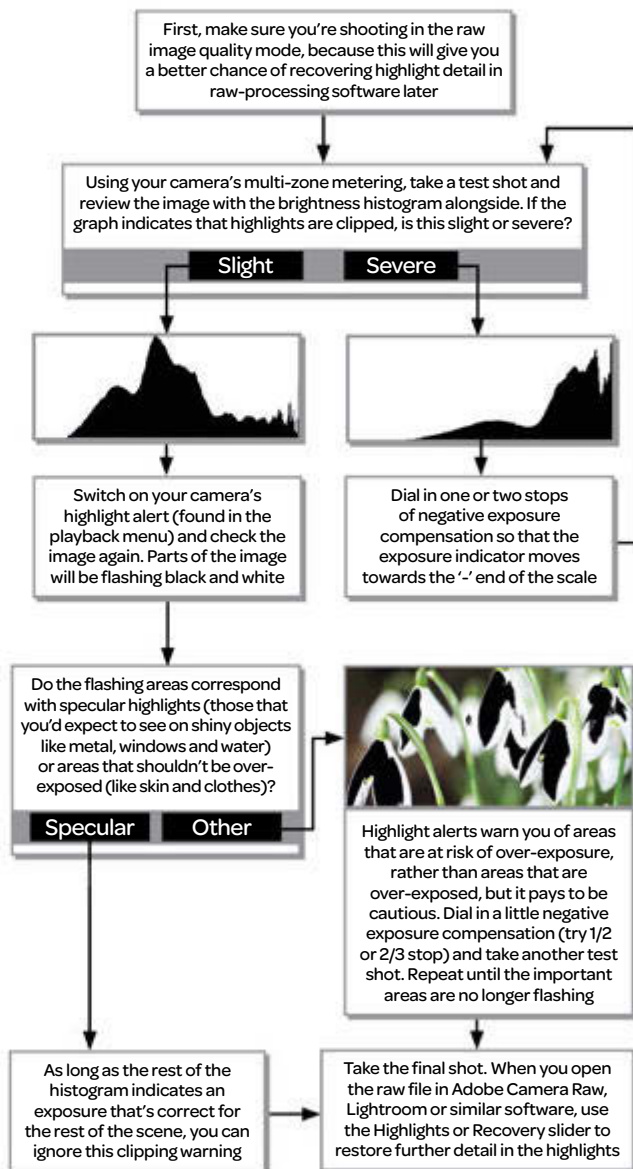


Highlights

Photos can be ruined by over-exposed highlights. Here's how to rescue them

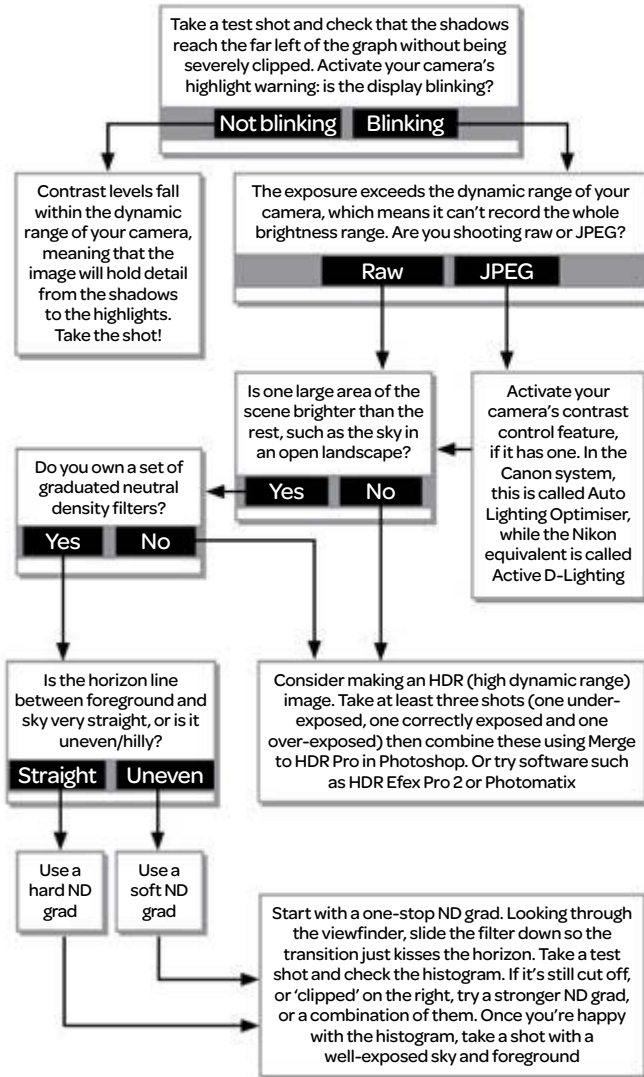


The majority of SLRs offer three metering modes: Multi-zone, Centre-weighted and Spot. The default Multi-zone mode takes individual light readings from multiple segments across the entire frame before the camera sets an exposure. Also taken into account are the active autofocus point, the size and distance of the subject and any backlighting. Centre-weighted takes its reading across the entire frame, assuming the subject will be towards the centre of the picture. For precise measurement, Spot metering is best. It takes its reading from a very small area of the frame.



High contrast

If the sky is much brighter than the land, you'll need to take steps to restore the balance

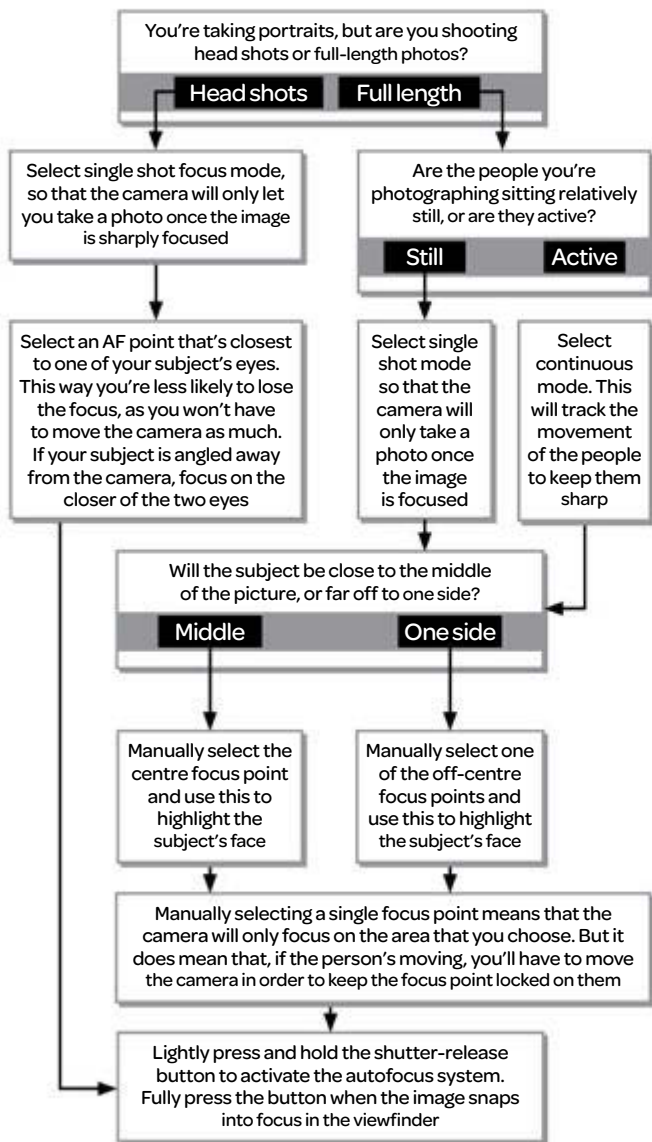


Your camera's exposure level scale, measured in stops, is visible in the viewfinder or on the LCD screen. The marker in the middle of the scale represents the 'correct' exposure, according to the meter. To make the next shot brighter, press and hold the button marked '+/-' and rotate the control dial so the indicator moves towards the '+' end of the scale. To make it darker, move it towards the '-' end. How much compensation you need to apply depends on the subject.



Portraits

Learn how to select the right autofocus mode to ensure pin-sharp eyes in people shots



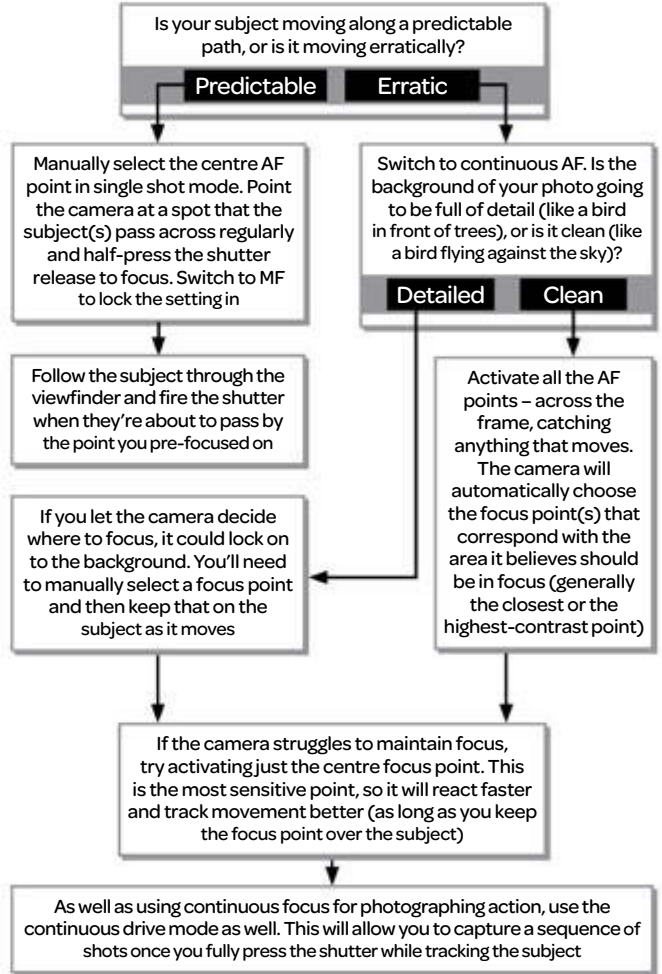
Picking the right focusing mode for your subject is essential if you want sharp results. Most SLRs come with one manual focusing mode and three auto options, including single shot, continuous and an automatic mode that switches between the two.

These auto modes all work the same way (lightly press the shutter release and the lens will focus) but each suits a different type of subject. Single shot AF is perfect for most shooting situations. The picture will be sharply focused, unless you move closer or further away from the subject after locking focus. Use single shot AF when you're shooting static subjects.

Action

Choose the right AF point set-up so you can stay on target with fast-moving subjects

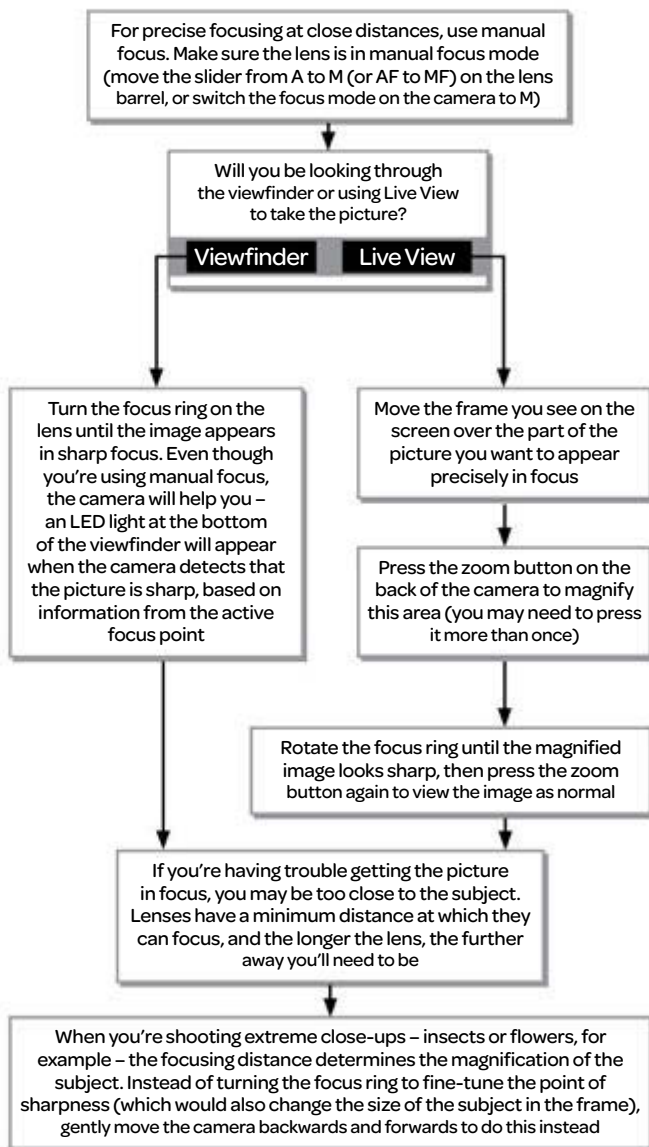
A I Servo AF (Canon) and Continuous-servo AF (Nikon) adjusts the focus as long as you press the shutter release, so it's the best mode to use when shooting moving subjects. The focus position is never locked, and the camera will let you fully press the shutter to take a picture even if the subject isn't in focus.



Close-ups

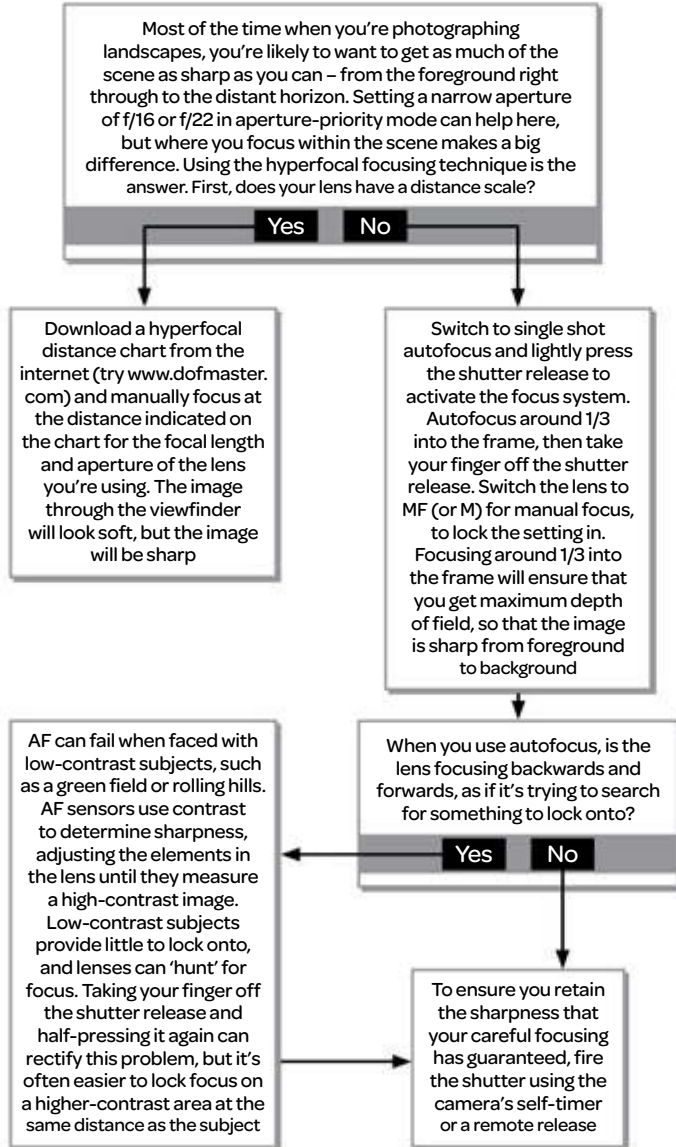
Use manual focus and your camera's Live View mode when you're shooting on a small scale

Live View is best reserved for slower-paced photography. In fact, it's perfectly suited to close-ups, landscapes, portraits, still lifes and other types of pictures where precision is more important than split-second reaction times. With the camera mounted on a tripod, manual focus is a breeze with Live View. By moving the small frame around the screen to highlight an area you want to check for precise focus, and then pressing the magnification/zoom button on the back of the camera, you can zoom to see if it's sharp. You can then twist the focus ring on the lens to fine-tune the focus.



Landscape detail

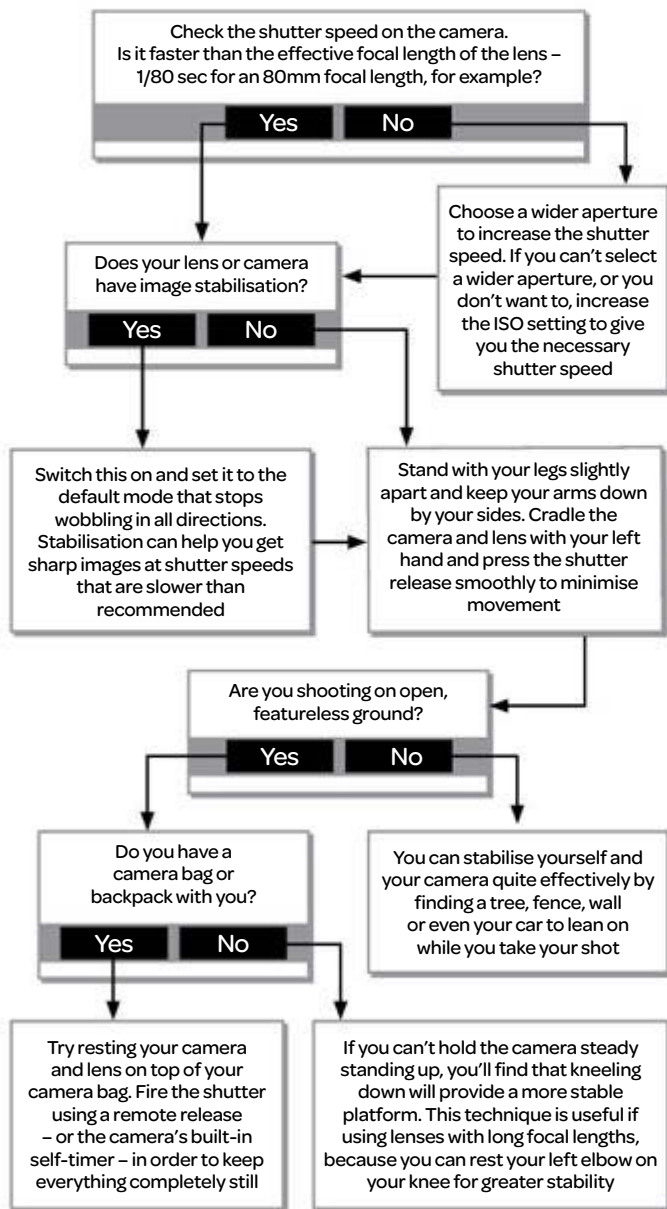
Follow our advice to make sure you capture your entire scene in focus, from front to back



All cameras enable you to activate the autofocus system by lightly pressing the shutter-release button, but many also feature an AF button that does the same thing. You can usually customise the operation of both of these buttons, such as removing the autofocus from the shutter release altogether or enabling the rear AF button to stop autofocus instead.

Handheld

When a tripod isn't convenient, use these simple tricks to steady your camera for sharper shots



There are many factors that contribute to how sharp your pictures are, including the quality of the camera lens and how accurately it's focused, and the choice of aperture and shutter speed. Camera shake remains the biggest concern though. Camera shake is the result of the shutter speed being too slow to hold the camera steady. In terms of sharpness, there are two considerations: is the shutter speed fast enough to a) stop the subject's movement and b) ensure that you can hold the camera steady during the exposure? If the shutter speed isn't fast enough, increase the ISO.

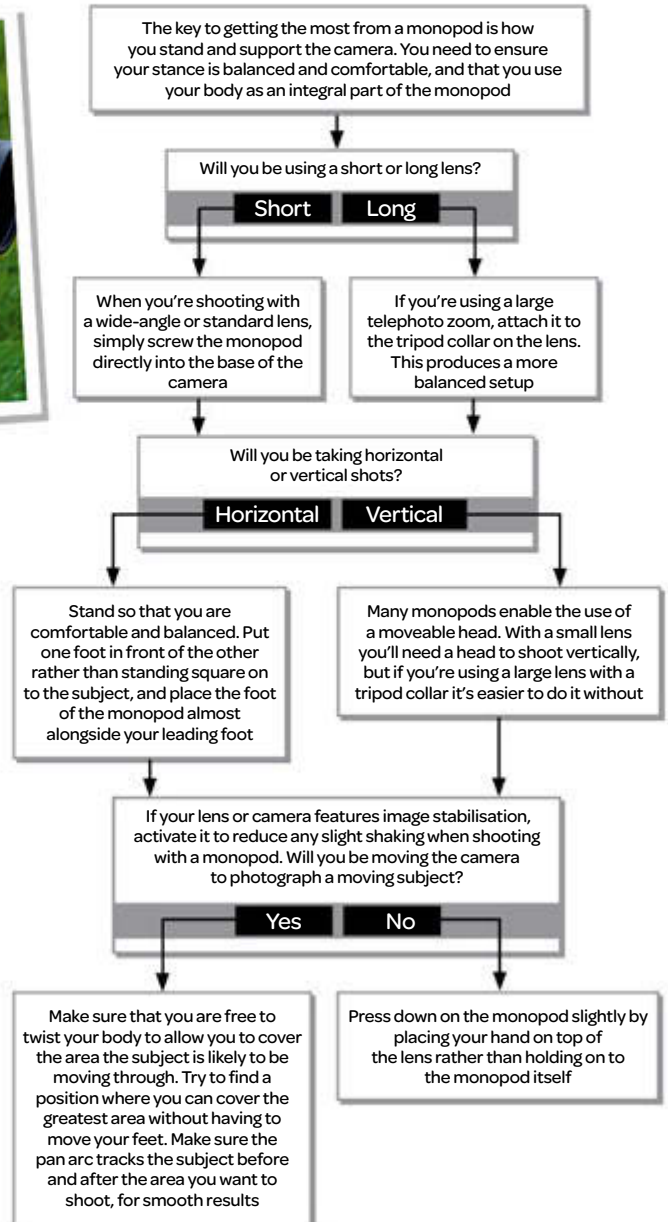
Monopod

Lightweight and mobile, monopods give you extra stability without slowing you down



Narrower apertures (such as f/11 and f/16) increase the depth of field (the amount of the picture that appears sharp). The trade-off is that they require longer shutter speeds – and this increases the chance of a blurred photo caused by camera shake.

Wider apertures can give you the faster shutter speeds required to freeze any camera movement, but the depth of field can be less.



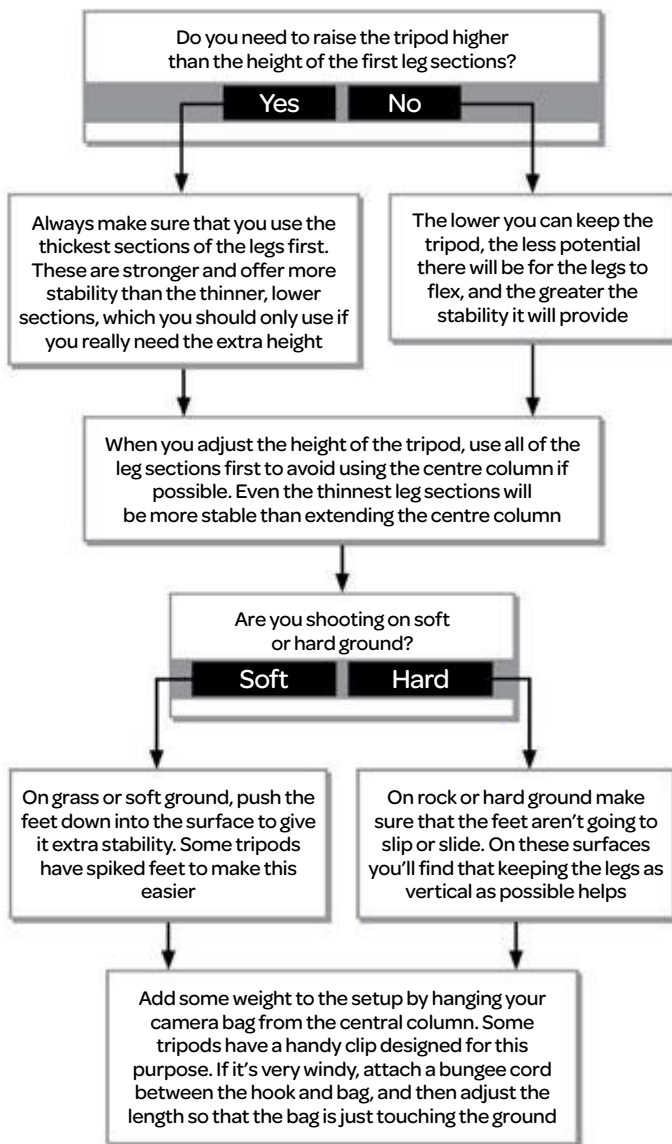
Tripod

There's more to getting the best from a tripod than attaching your camera and firing



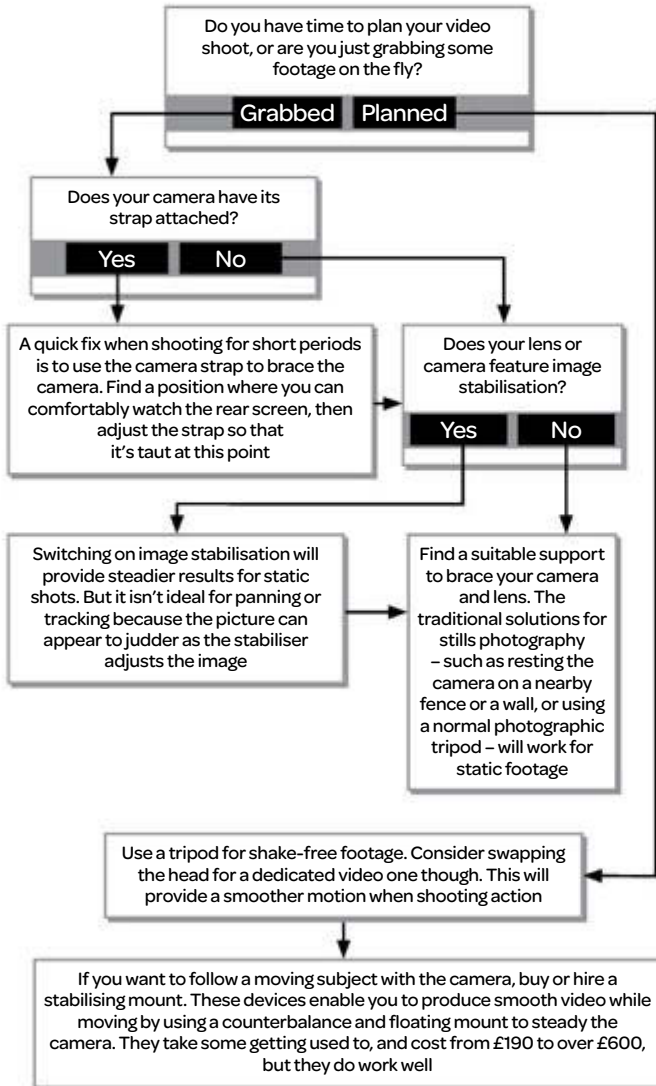
Supporting your camera and lens on a tripod or similar will give you the sharpest pictures. That is, as long as the support is sturdy enough to hold the combined weight of your lens and camera, and you follow good technique.

If you're in the market for a new tripod, consider getting one with fewer leg sections, because these tend to provide more stability. Make sure that you get one that extends to your eye level without the need for the centre column, and choose a head that locks up firmly. A bubble level can help you get the camera and lens centred, ensuring that the load is balanced.



Smooth video

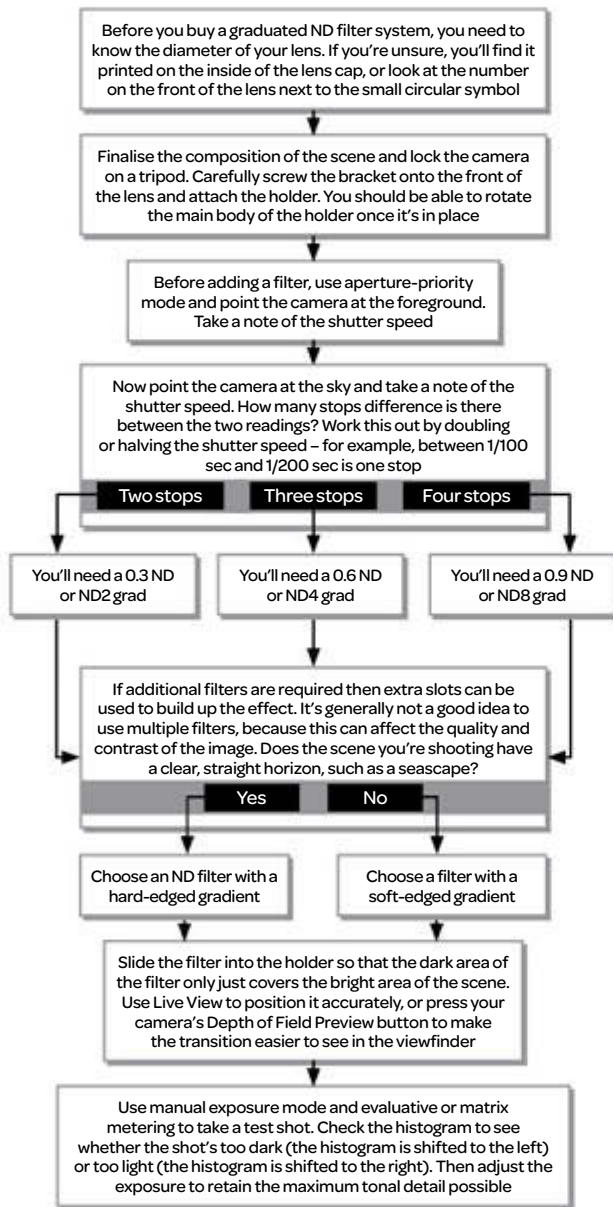
Follow these steps to eliminate the shakes when shooting HD video on your SLR



The longer the lens, the greater the risk of camera shake. Not only are telephotos more cumbersome, making them more difficult to hold steady, but their narrow angle of view means that any small movement will be magnified. Nudge a 50mm lens and you'll see the image jiggle in the viewfinder. Do the same with a 500mm lens and the image jerks about all over the place.

ND grad

Learn how to balance your landscape exposures with the correct type of graduated filter

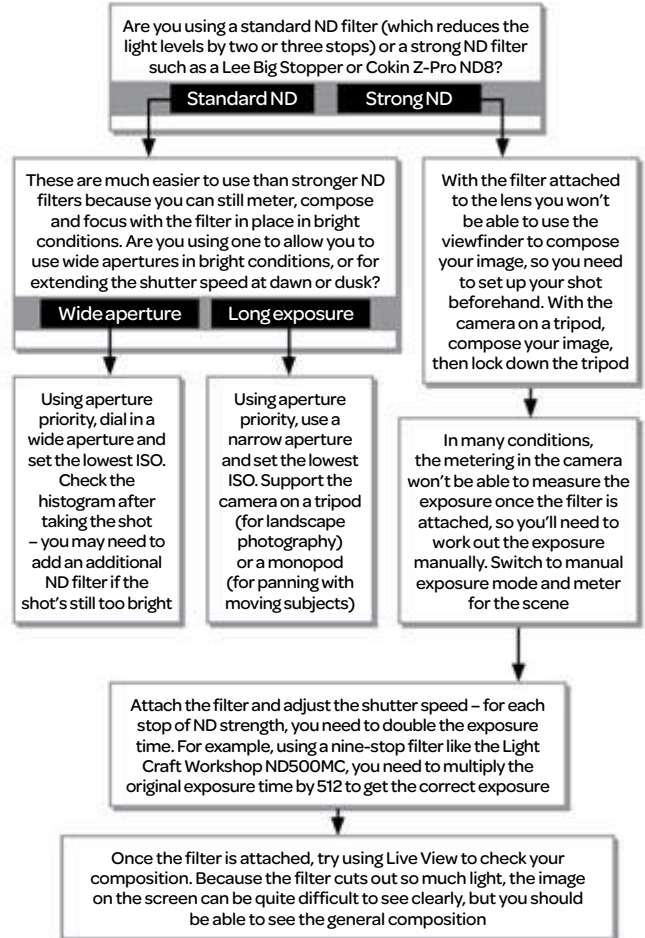


Back in the days of film, filters were essential for creating any kind of special effect. Although we now have digital filters available in imaging software like Photoshop, traditional filters still have their place. It's just that you don't have to carry around quite as many. Graduated neutral density (ND grad) filters are grey at the top, blending to clear at the bottom, so they can balance the (sometimes huge) difference in exposure between a bright sky and a landscape. Without a filter, the landscape would be too dark, or the sky would be far too bright and hold no detail. Square ND grad filters need a holder and an adaptor ring to attach them to the lens.

Standard ND

Fit one of these to use super-slow shutter speeds or wide apertures in very bright sunlight

ND filters reduce the amount of light entering the lens, and are available in various strengths. They're often used to create milky water and blurred cloud effects, or to reduce the chances of over-exposure when using wide apertures in very bright light. They come in two types: variable and non-variable. The variable ones enable you to increase or decrease the opacity of the filter.



NUMBERS EXPLAINED

Different manufacturers use different numbering systems to show the strength of their ND filters. Here's an easy-to-read conversion table for the commonly used systems...

EV or stops	1	2	3	4	5	6	7	8	9	10
Lee	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
Cokin & Hoya	ND2	ND4	ND8	ND16	ND32	ND64	ND128	ND256	ND500	ND1000

Circular polariser

Give your pictures a professional sheen by boosting contrast and removing reflections with a polarising filter

Polarising filters are available in either round or square/rectangular designs. The round filters simply screw onto the front of your lens, while the square type need a holder and an adaptor ring to attach them. Which system you should choose depends on the type and number of filters you're likely to use, and also the lenses you'll want to use them with.

The polarising filter's ability to deepen blue skies and reduce harsh reflections on water and glass make it an indispensable tool for any photographer who loves shooting landscapes. For compatibility with a digital SLR, get a circular type.



Polarising filters are expensive, particularly those for the Cokin or Lee 100mm square systems. We'd recommend buying a screw-in polariser to fit the lens with the largest filter thread in your collection, then using step-up rings for your smaller lenses

Attach the filter to your lens. If the front of the lens rotates as the camera focuses, the effect will change. In this case, focus first, then adjust the filter. Don't overtighten the filter, because it can be tricky to remove later. Make a note of the direction you rotated the filter to attach it

Polarising filters feature two lenses that can be rotated to increase or decrease the strength of the effect. Turn the front element in the same direction as you used to attach the filter to the lens, otherwise you'll inadvertently loosen it

Are you using the polariser to darken blue skies and make clouds look crisp, or to remove reflections and glare in a scene?

Enhance blue skies **Reduce reflections**

The effect will be at its most dramatic when you're shooting at right angles to the sun. Point your index finger at the sun and extend your thumb out at 90° to find the ideal position

Look through the viewfinder and rotate the filter to see how the image changes. Does one area of the sky look darker than the other?

Yes **No**

The problem with using these filters with wide-angle lenses is that the effect is quite direction specific, so one large expanse of sky tends to be much more heavily polarised than other areas. The answer is to switch to a less extreme wide-angle lens

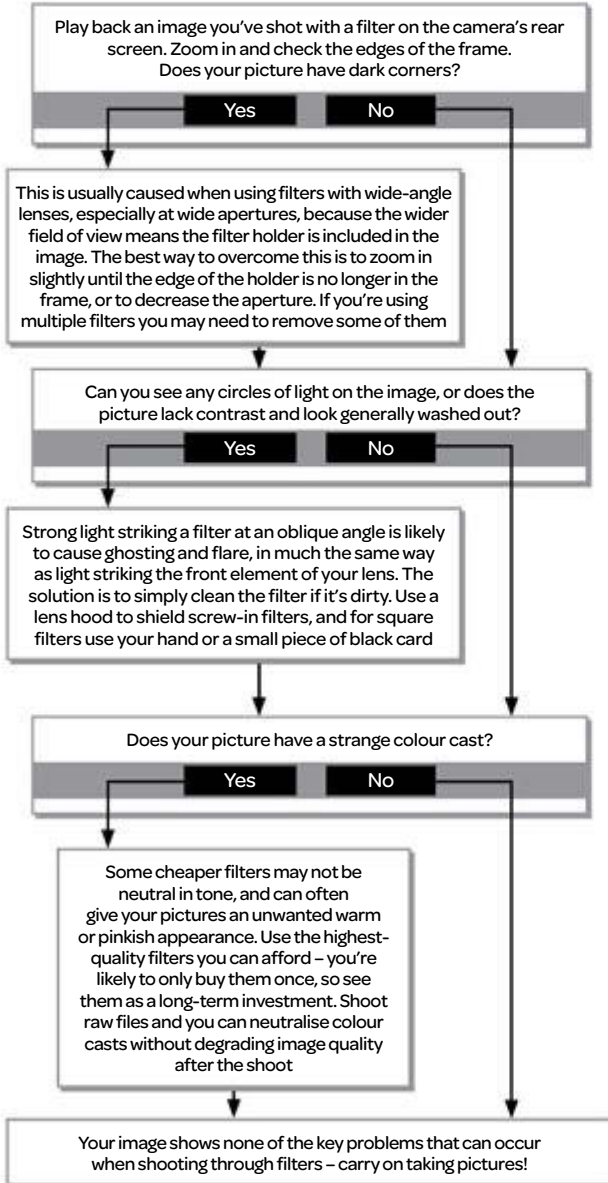
Adjust the effect to taste and shoot

Look through the viewfinder. When it comes to shooting water, you'll see reflections in the surface disappear and appear as you rotate the filter, and you need to stop when the effect looks best. This can take a little practice because the changes can be subtle, so take your time

One final consideration is that polarisers can reduce the exposure by up to two stops, so it can have a similar effect to an ND filter, allowing you to use slower shutter speeds than without the filter attached. You may need a tripod if you're shooting in low light

Filter solutions

Common issues that can affect your images when using filters, and how to avoid them

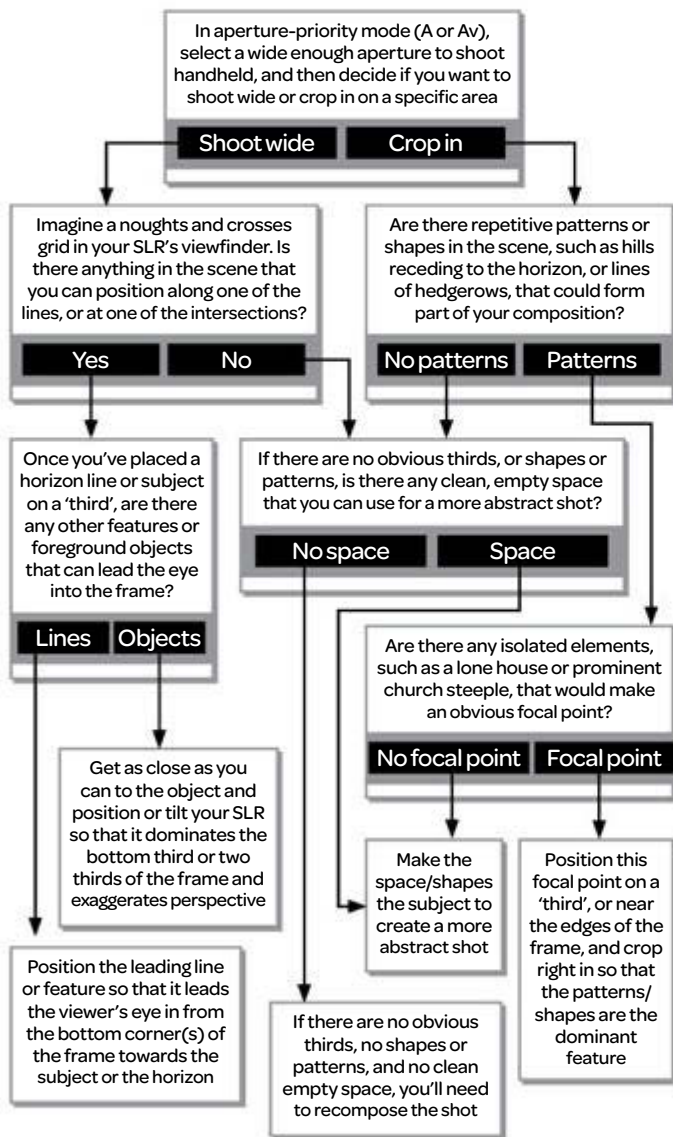


Your camera's internal light metering system, which measures light 'through the lens', will automatically correct for filters in the vast majority of cases.

However, a little fine-tuning is often needed, so it's best to review shots on the camera's LCD screen with the histogram overlay, dial-in any exposure compensation that's required, then re-shoot the subject.

Composition

Before you even think about exposure, you need to frame your scene



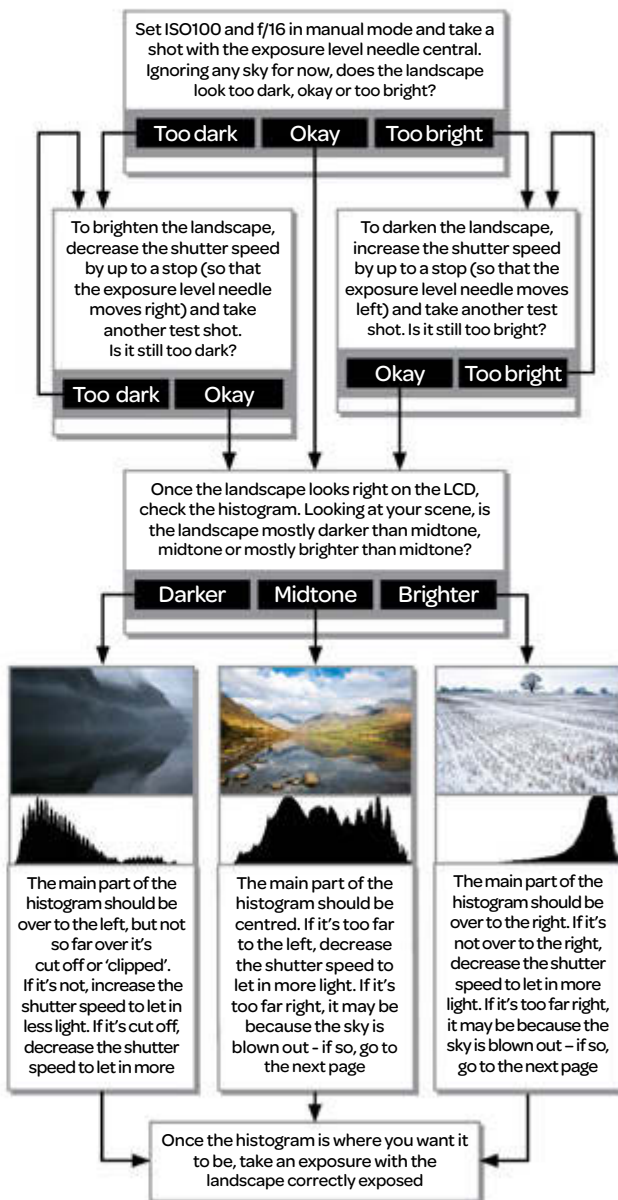
When it comes to landscapes, weather is key. The mistake many of us make is deciding we want to shoot a landscape, and then heading out when the weather looks half decent and hoping for the best. A landscape pro, on the other hand, will keep an eye out not just for good weather, but for weather that suits a particular location: a clear night may spell early morning mist over some nearby hills, for example. This means thinking weeks ahead, and having a checklist of locations that suit specific conditions. Getting great shots often involves going back to the same spot again and again.

Foreground exposure

Make friends with your histogram and you'll never take a bad exposure again

Rolling hills receding into the distance may look drab and grey when it's overcast, but breathtaking when the light is right. It's

important to keep your eyes peeled even when you're not out shooting, and to make a note of any locations that look promising, so that you can come back when conditions are suitable. Knowing what conditions suit a particular location is largely down to experience.

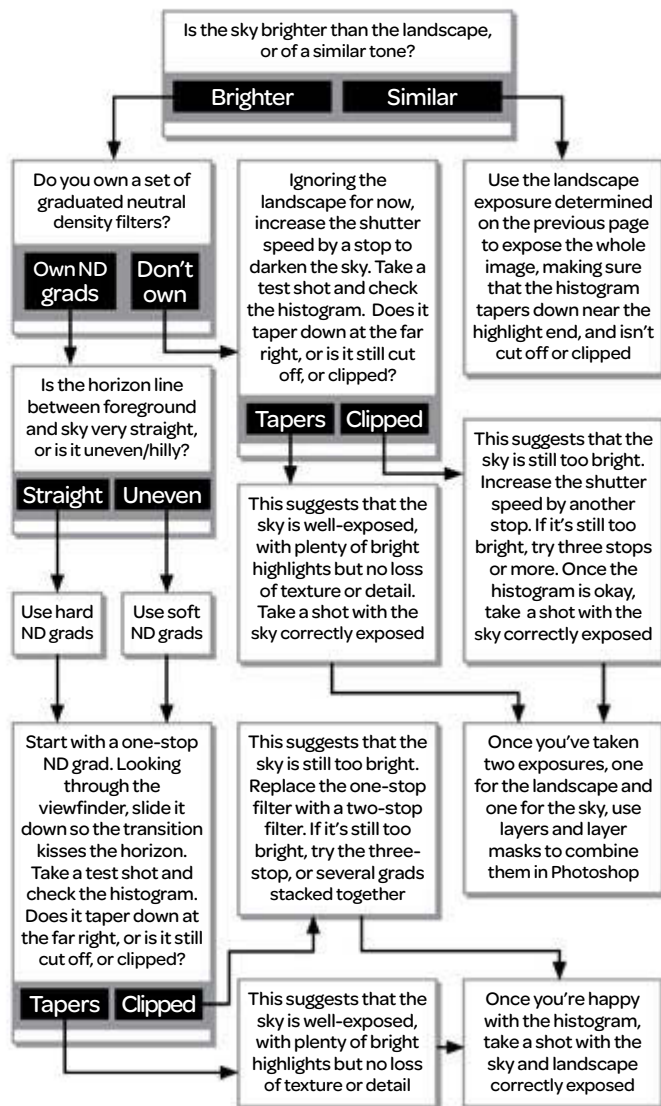


Sky exposure

Over-exposed skies are a common problem. Here's how to avoid them

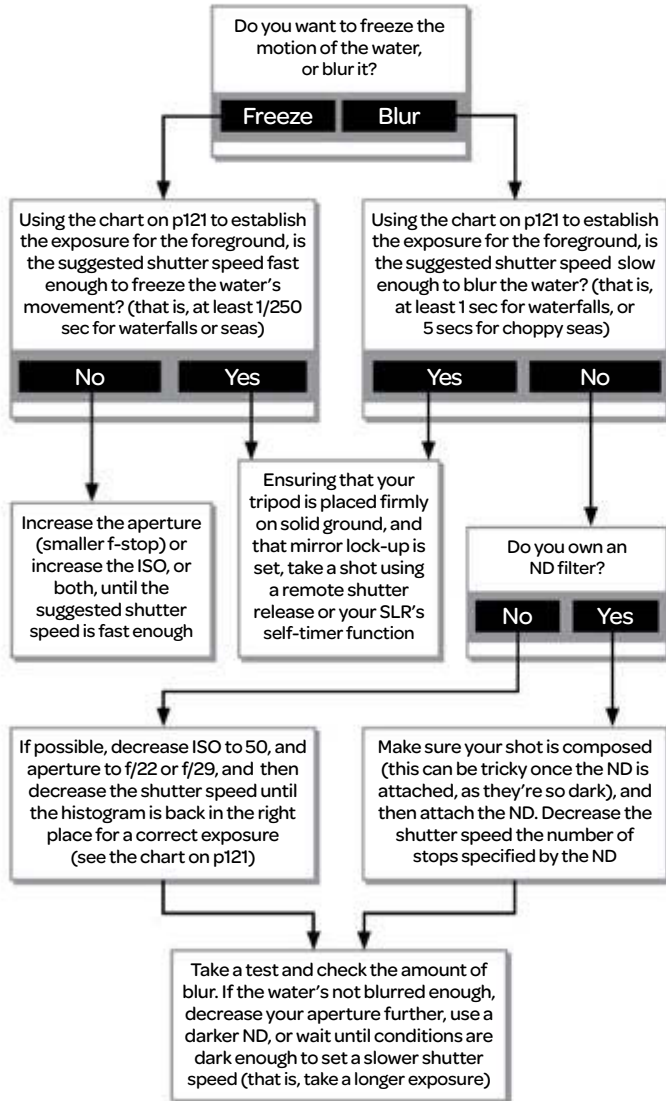
ND grads are essential if you're serious about landscape photography.

When shooting an hour or two either side of sunrise or sunset, the sky will invariably be much brighter than the landscape; expose for the sky and the landscape will be in silhouette; expose for the landscape and the sky will be blown out. An ND grad is dark at the top and clear at the bottom, enabling you to darken the sky without affecting the landscape. It can be hard to balance the exposure between the foreground and the sky when you shoot a sunrise or sunset, even using ND grads. For a balanced result, try the Graduated Filter adjustment in Camera Raw.



Moving water

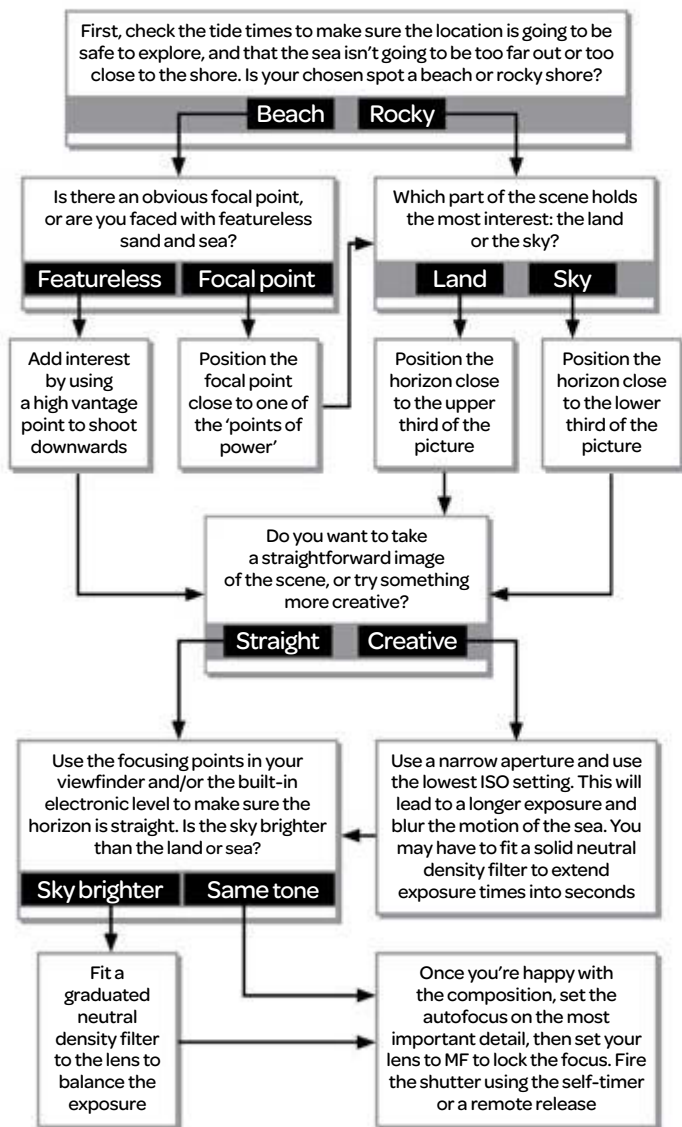
If you want to blur water, you need to find a way to increase exposure times



When photographing landscapes you want your image to be as sharp as possible, from every little detail in the foreground to tree tops on the distant horizon. The best way to achieve this, of course, is to set a narrow aperture to ensure good depth of field. However, you need to couple this with an ND filter if you're shooting a seascape and you'd like the water to render as a blur.

The coast

Master composition, focusing and exposure to get super seaside shots



One of the key steps to creating a well-balanced scenic shot is deciding where to place the horizon. Letting it run straight through the centre of the frame splits the image in half.

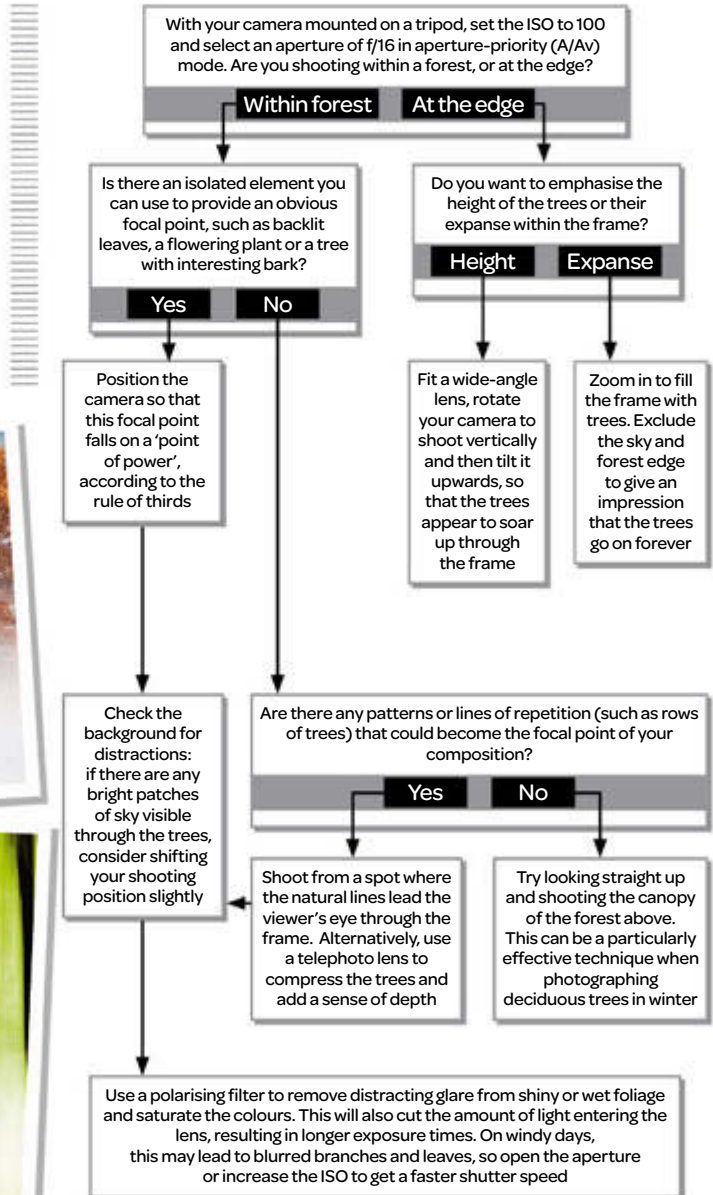
This may suit subjects that are mirrored in lakes and ponds, but otherwise it rarely creates a balanced result. Instead, imagine a 3x3 grid overlaid on the image (or activate your camera's built-in framing guide) and place the horizon along one of the grid lines. Place the horizon one third from the top of the frame if the foreground is the focus, and one third from the bottom of the frame if the sky is where the interest is.

Woodlands

Head for the forest and think about composition for powerful shots of trees and woodlands

Without foreground, your photos will appear flat and two-dimensional.

Adding interest at the foot of the frame gives balance and depth to a scene. When you take pictures in woods and forests, keep an eye out for 'hotspots', where the sky can be seen through breaks in the tree cover. The viewers' eyes will be drawn to any bright areas, and this may take attention away from the focal point.

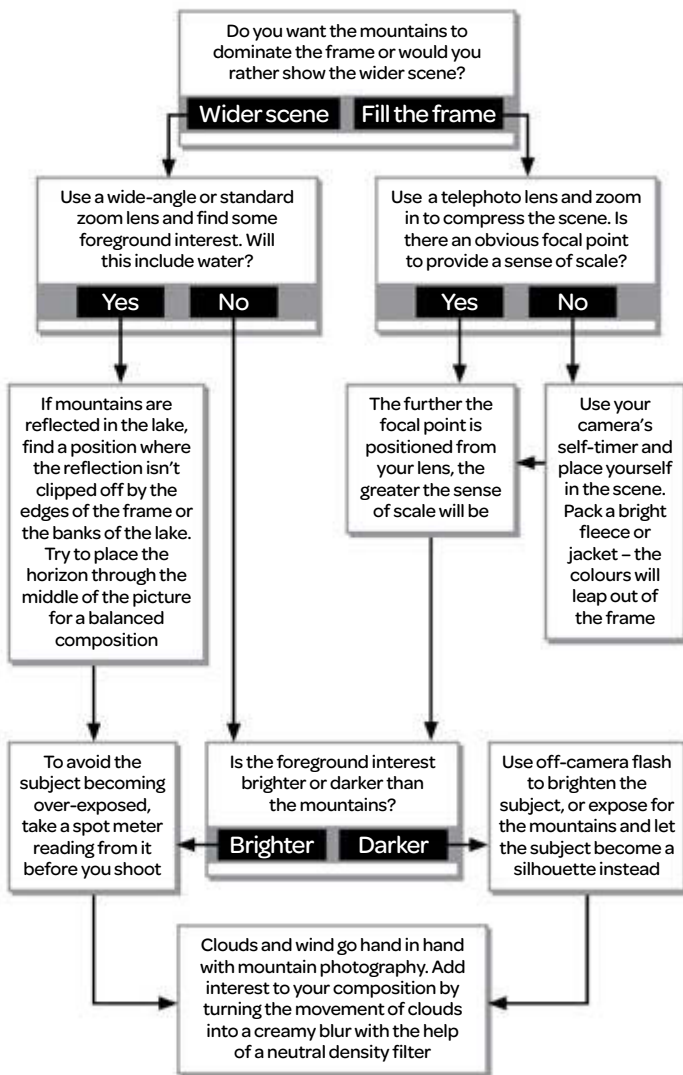


Mountains

Heading for the hills? Use our tips to get dramatic shots of mountains big and small

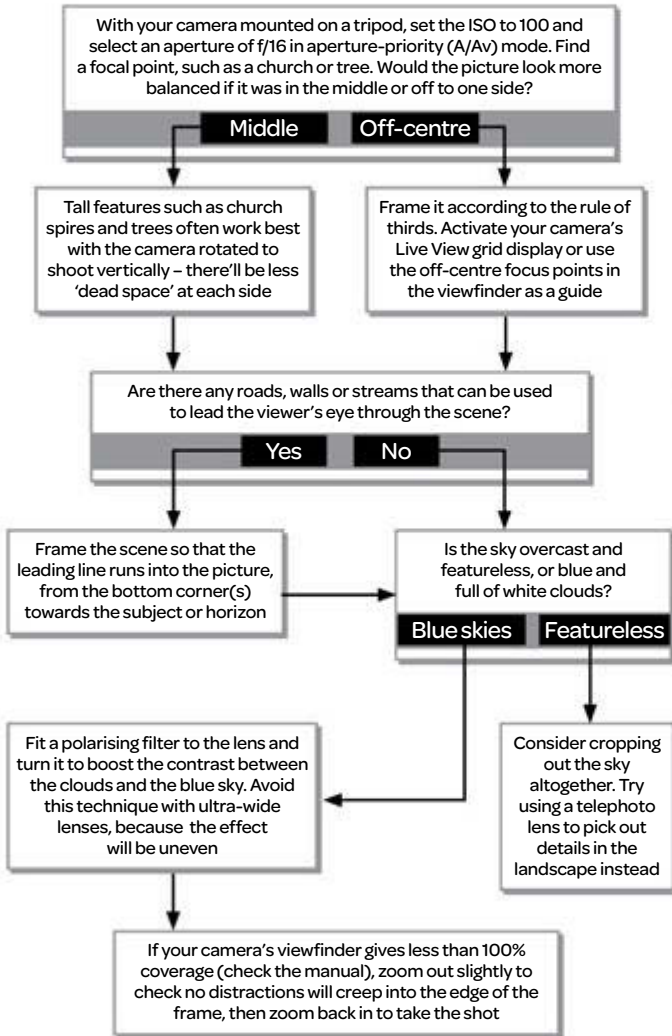
Foreground interest can improve landscape images in a number of ways – it's more than just filling an empty space. It helps to give the scene a sense of scale, and it makes the progression from the near to the middle and far elements clearer, creating a journey for the viewer's eye.

Commit to a foreground and you're saying to the viewer: "Of all the things in this great picture, I want you to look at this ahead of all others!" Don't, then, sell them short. Look for that boulder with the most brightly coloured lichens or the most wavy lines on it. And don't forget to find the best position to shoot from.



Countryside

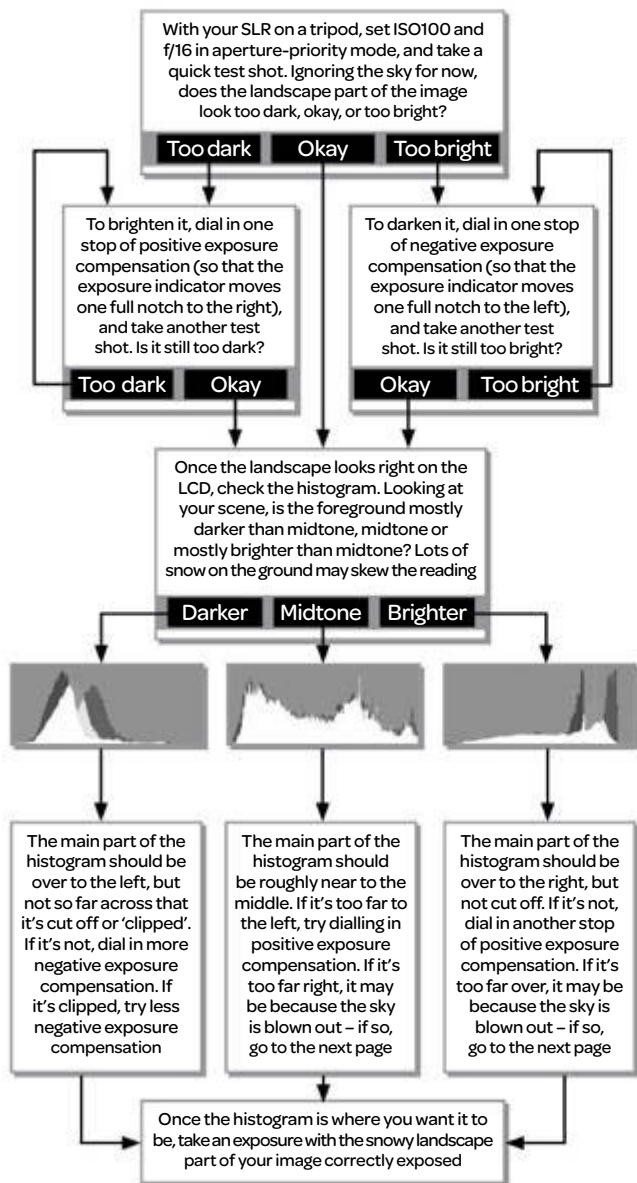
Use natural features and clever composition to get eye-catching countryside shots



When we're out in the countryside or at the coast we look at the view in a very different way to the way we look at a photograph. Our eyes scan around and we home in on small details or the horizon, ignoring things in our peripheral vision – often not seeing what's immediately in front of us. Yet when we look at a photograph of the scene, the foreground becomes much more important.

Winter snowscapes

If your landscape is covered in snow, follow the steps below for spot-on exposures



The key consideration when photographing winter landscapes, and more specifically landscapes that feature a lot of snow and ice, is exposure.

Left to its own devices, a camera's light meter will always try to produce an image that's made up mostly of midtones. This is because 95% of the scenes we shoot, at least in daylight, are made up of midtones. Problems arise when you try to shoot something that isn't made up of midtones: whether it's a bank of white snow or a sheet of black velvet, your camera will set the exposure to produce an image dominated by midtones.

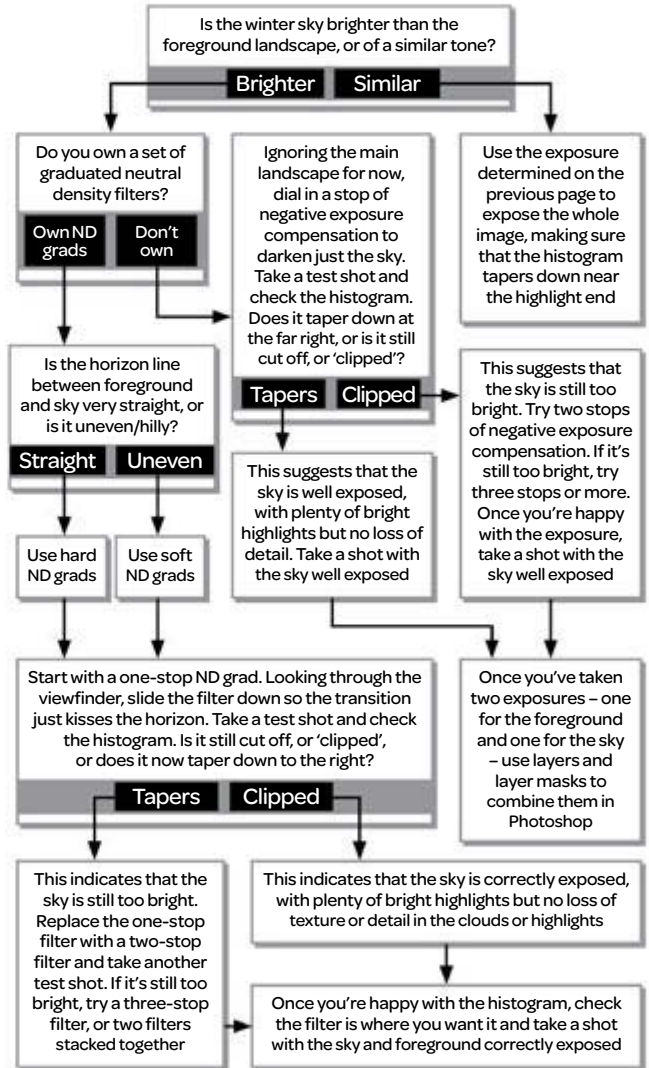
Winter skies

If the sky is much brighter than the landscape, you'll need to take this into account too

Once you've got your essential settings sorted, the next step is to establish a routine

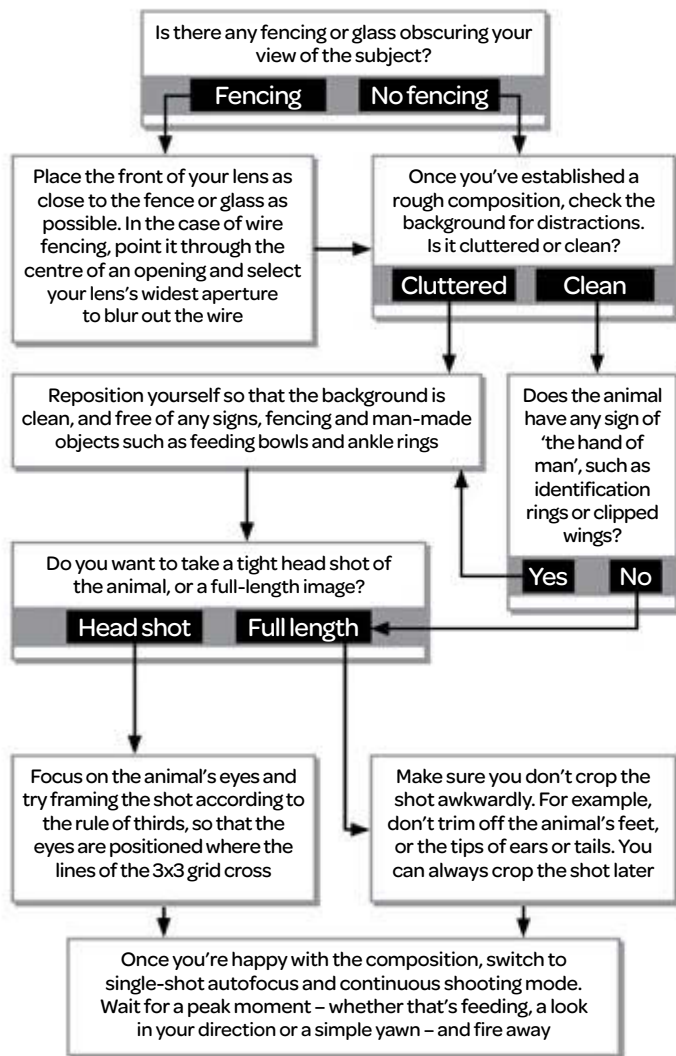
that will work when shooting almost any winter landscape.

Your approach should be broken down into four distinct sections: composing, exposing for landscapes covered in snow, exposing for landscapes with limited snow, and exposing skies that are much brighter than the landscape itself.



Wildlife parks

Nature reserves and captive animal collections are great places to practise your long-lens skills



Wildlife photography requires patience, persistence and skill.

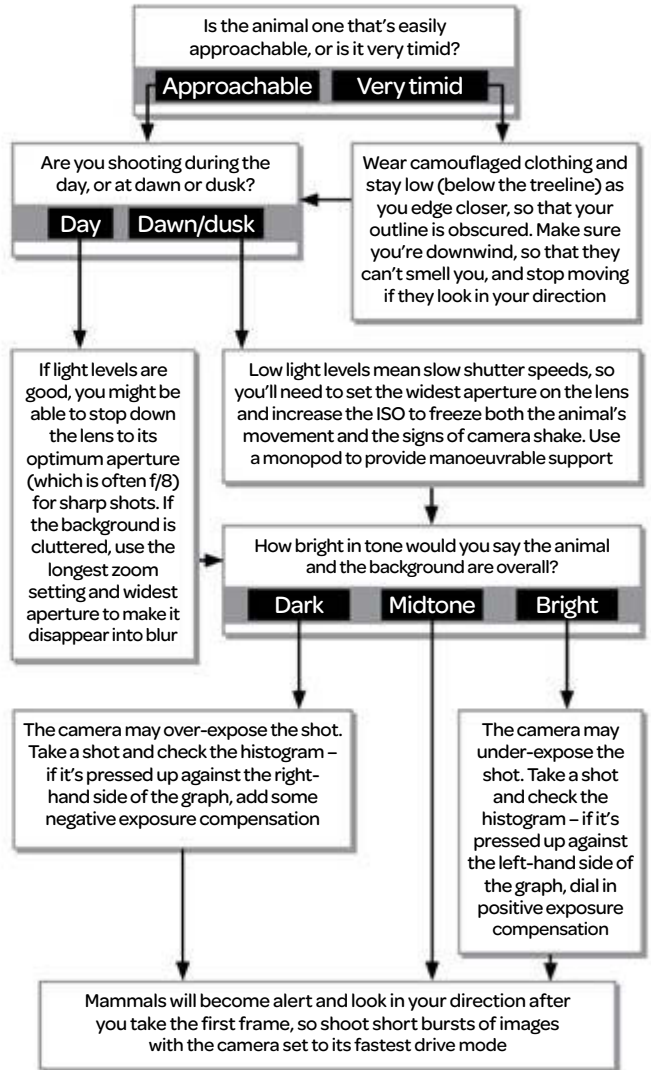
Photographing wildlife is inherently difficult – arguably far more so than a posed portrait or landscape – and there will be times when you come back from a shoot with nothing to show for your efforts. But it isn't impossible, and the rewards for your patience when working with such unwilling subjects are powerful images that give an insight into rarely seen moments of their natural life. Knowing your subject and its behaviour is key – but don't forget the photography basics.

Safari parks

How to get close to a wild animal and make sure you get the perfect shot in the bag



With some fast-moving subjects, just getting them in the frame is hard enough, but always think about the composition of the shot – if you've been in a hide for a week waiting for the magic moment, make the picture worthy of the effort you've gone to. The rule of thirds works for wildlife, so consider placing your subject on the intersection of the thirds lines.

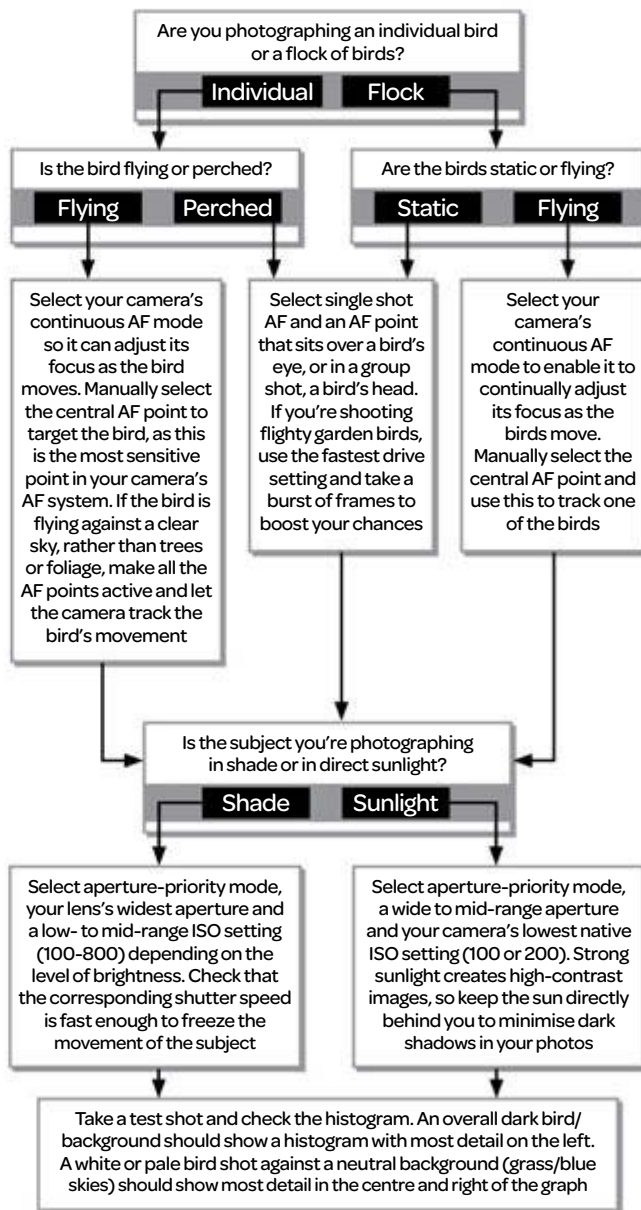


Wild birds

Choose the right camera settings, and with practice you'll get cracking shots, guaranteed

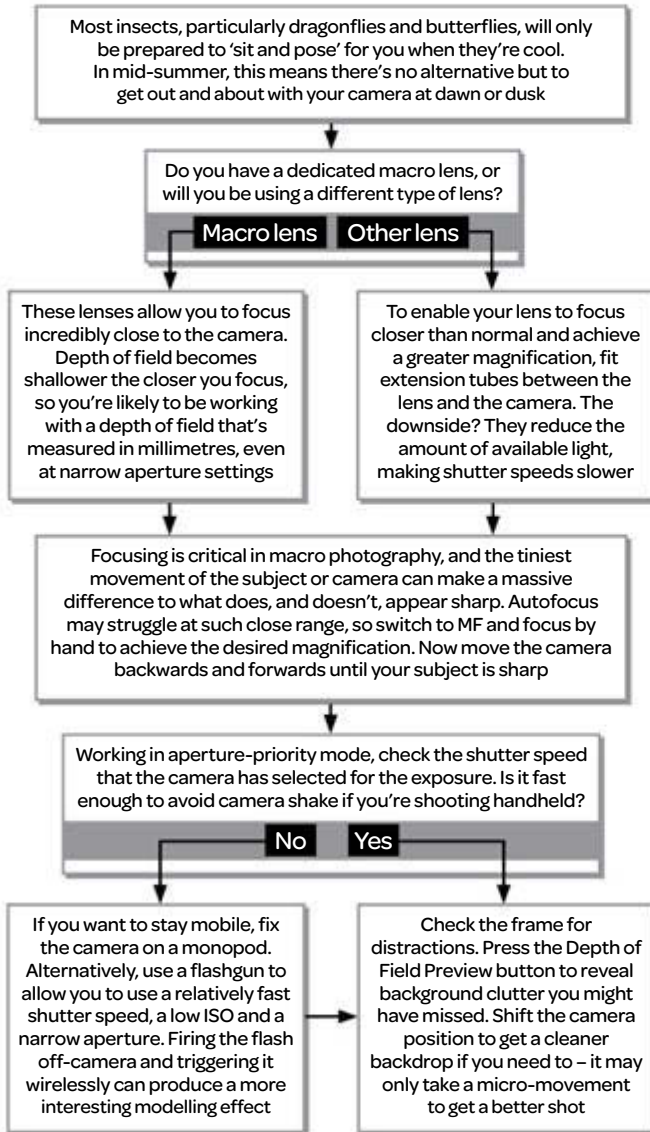


Most wild animals naturally blend into their surroundings, and it's not always possible to frame your subject against an uncluttered background. However, you can prevent the background from becoming a distraction by controlling the depth of field to throw it out of focus. Set your camera to aperture priority mode so you can change the aperture and control how much of the picture appears sharp. The precise aperture setting will depend on your focal length, distance from the subject and the subject-to-background distance. Always ensure the eyes are sharp.



Garden wildlife

Leave the big guns indoors and capture the natural world on a small scale instead



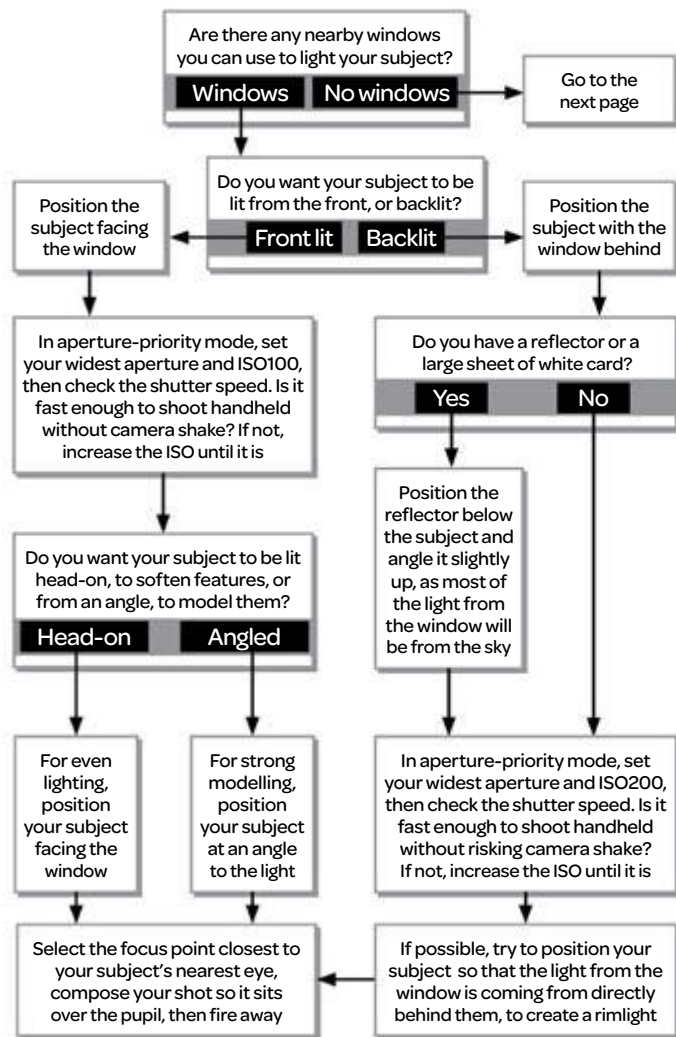
When taking animal portraits, try to take pictures from their eye level for a more intimate and engaging result.

Manually select a focus point that corresponds with the subject's eye – if you leave the camera to select the focus point automatically, it may latch on to the nearest feature to the camera, such as the edge of a wing. Use continuous focus for tracking moving animals in the frame, and don't be afraid to increase the ISO – a noisy picture is better than nothing.



Indoors with natural light

A window and a reflector are all you need to shoot beautifully lit portraits indoors

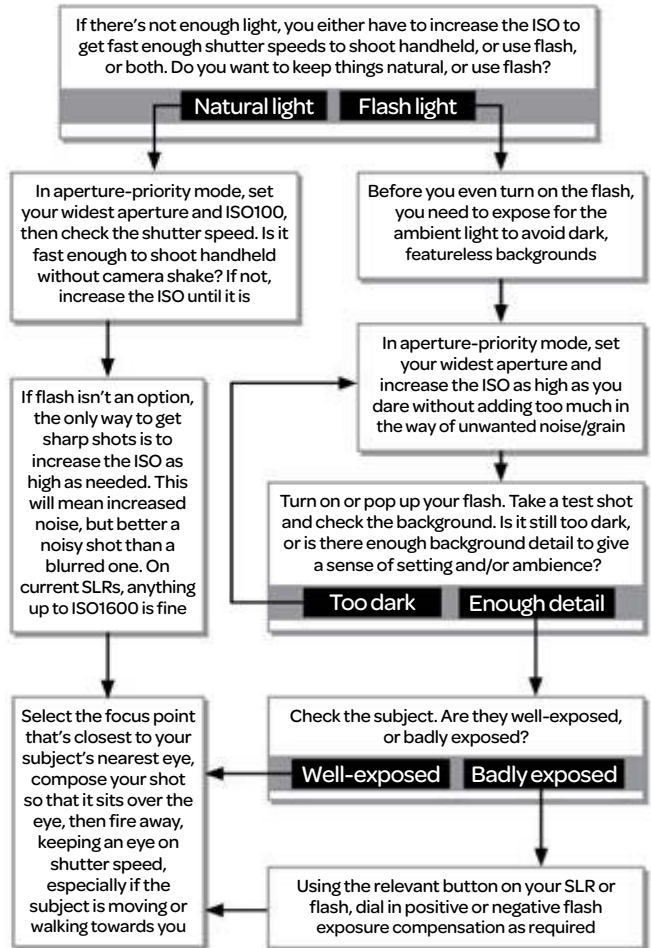


Where you shoot depends on the style you want to use, the time of year and what you want to achieve. But starting inside is a great way to get everyone accustomed to your camera. If the room feels cramped around your subject, try placing them in a corner and shooting from a low angle. This vantage point gives a greater emphasis to the lines where the floor meets the walls, which will travel from one central point out to the lower corners of your frame, giving the exaggerated appearance of open space. Using a wide-angle lens for this type of shot will enhance the effect even further.

Indoors in poor light

In gloomy interiors, you'll need to combine flash and ambient light

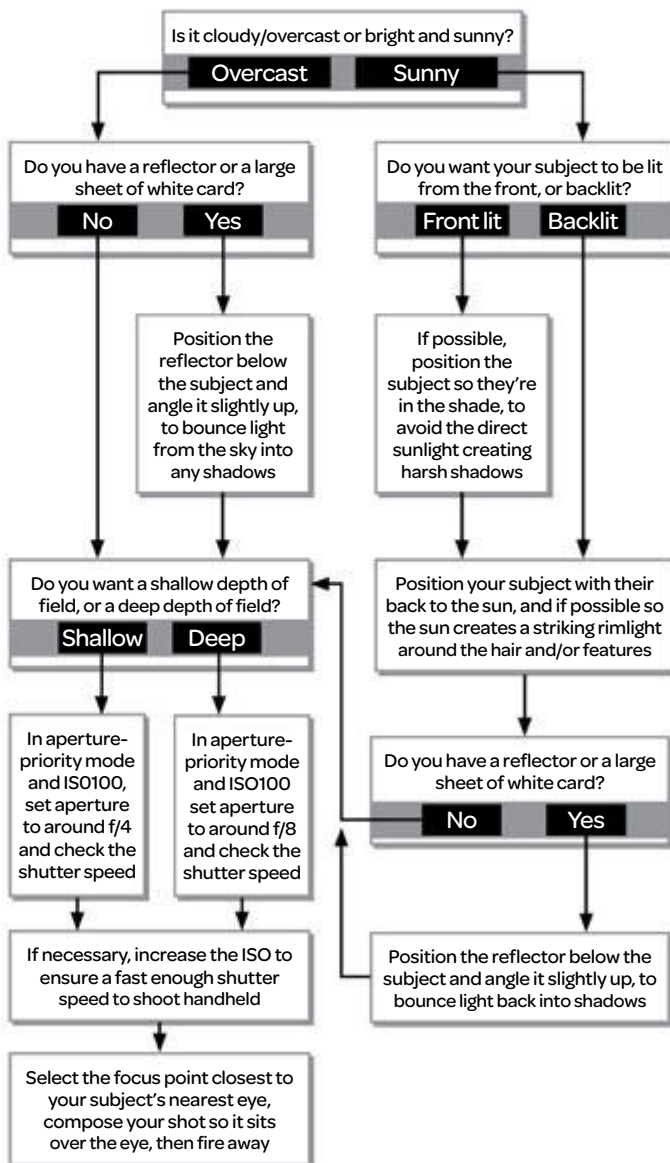
Position yourself close to a window for lovely, soft illumination, and use a reflector to fill in any shadows. The more light you can get onto your subject, the lower ISO rating you can set, enabling you to produce a higher quality image. If you really have to use flash, another option is to use a flash diffuser: the bigger and softer the diffuser, the less noticeable the flash burst will be.



Outdoors with natural light

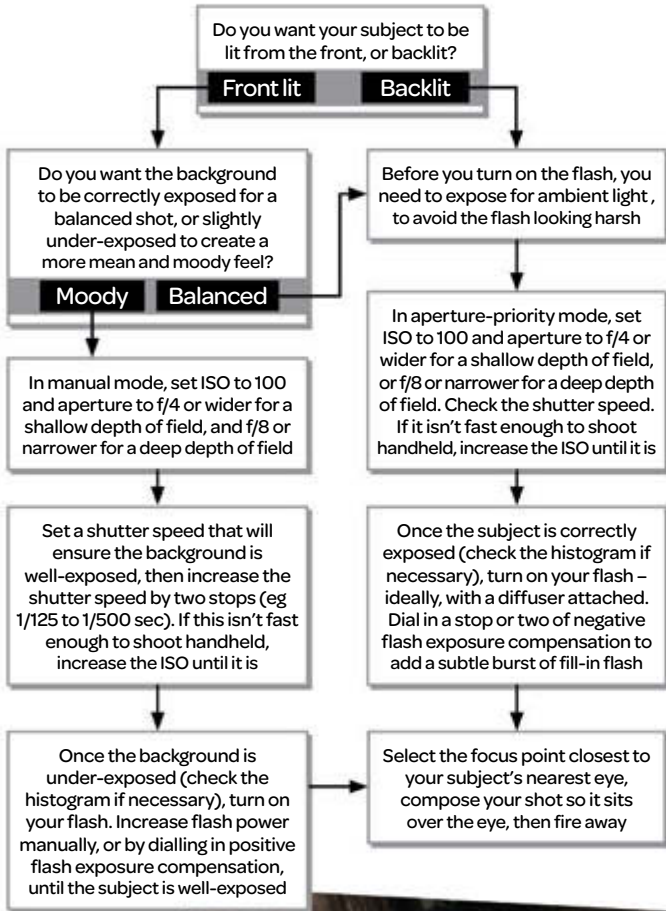
Shoot in the shade or with the sun behind your subject to avoid unflattering shadows

When photographing portraits, the sort of image you take – and the settings you need – will largely be down to lighting conditions, and specifically whether you're shooting indoors or outdoors, and with or without flash. The first thing to bear in mind is that you should always try to focus on the eyes. With this in mind, it's usually a good idea to select the autofocus point nearest to your subject's eye manually, rather than let your camera decide using auto AF point selection (and nearest to the closest eye if you're using a wide aperture and the face is at an angle to the camera).



Outdoors with flash

Don't just use flash for indoor portraits – use it to add impact to outdoor shots too

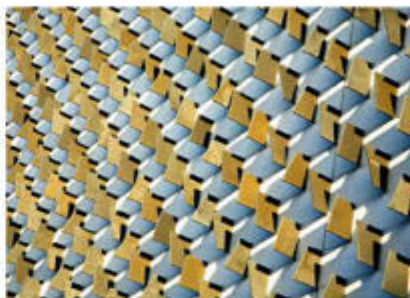
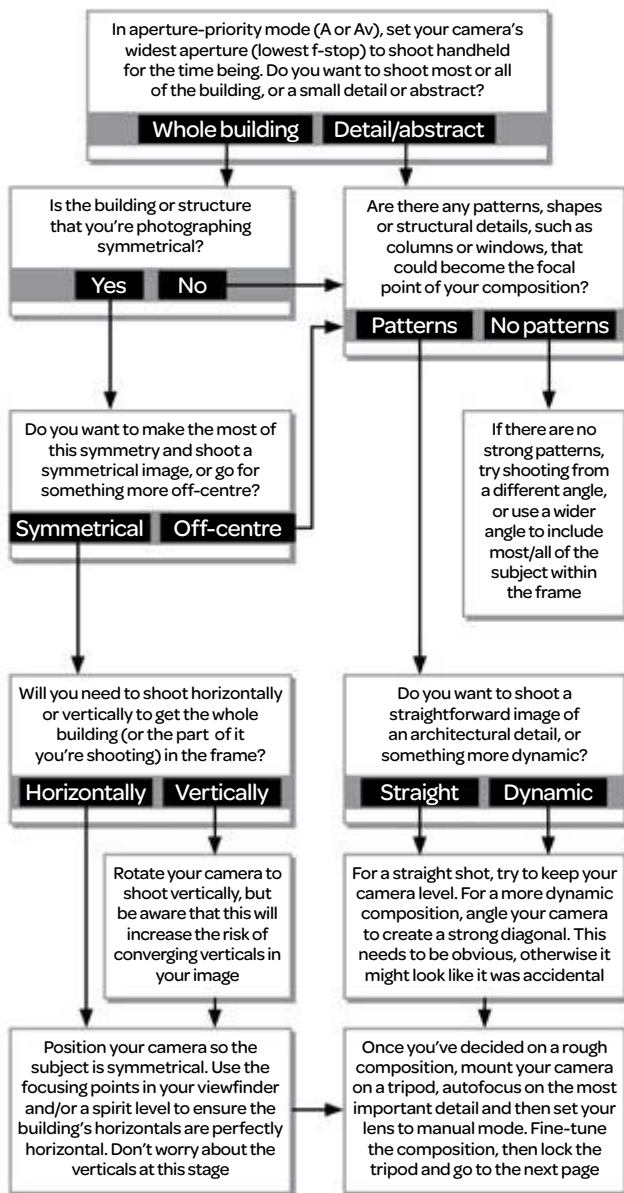


You don't have to go far to take cracking outdoor portraits – your own back garden makes the perfect location for a shoot.

Finding a neutral background or blurring it out with a wide aperture, such as f/4 or wider, is crucial to avoid distractions. Things such as washing lines, hanging baskets or garden tools in the background take the emphasis off the subject, and will make your pictures look messy.

Composition

Shoot handheld to explore every angle before getting all set up on a tripod



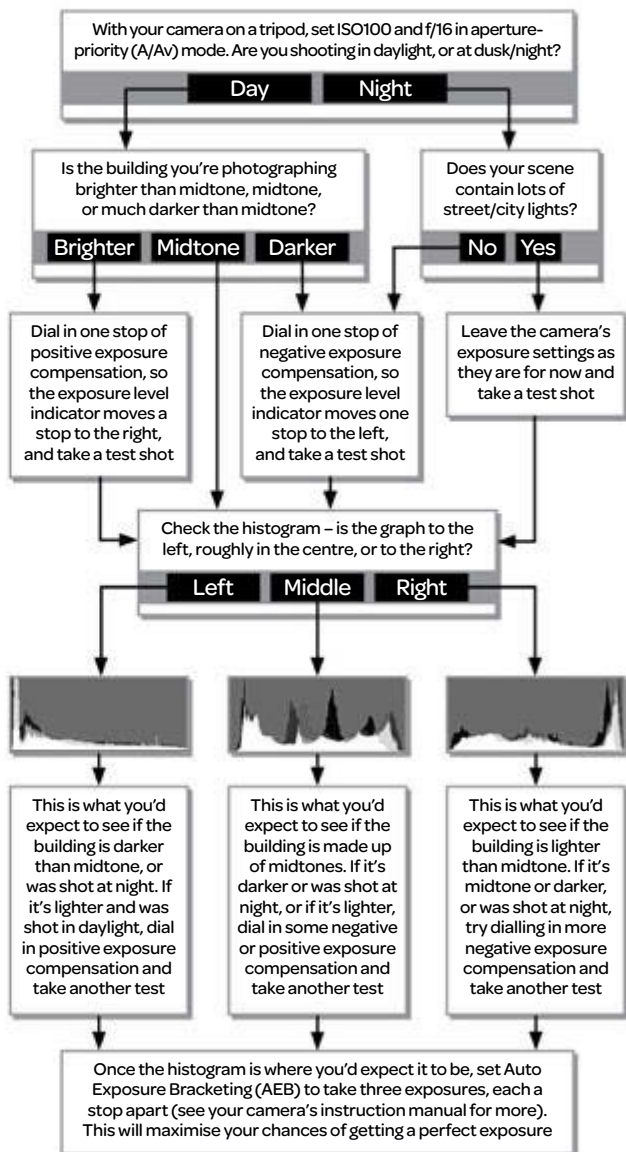
When architectural photographers take a photo of a building, their aim is to capture it at its best. They try to shoot it in the best light, at the best time of day and from the best possible angle – and preferably without any people cluttering it up. What they're trying to produce is a perfect, almost idealised view that's all crisp, clean lines and pristine surfaces. Of course, when most of us photograph buildings we're not doing it to keep a client happy, so we don't have to be so particular, but the same principles apply: the idea is not to just fill the frame and hope for the best.

Exterior exposure

Use an image's histogram to help you evaluate and fine-tune your exposure

You need to work out what time of day – and even what time of year – the light will be at its best for your chosen view.

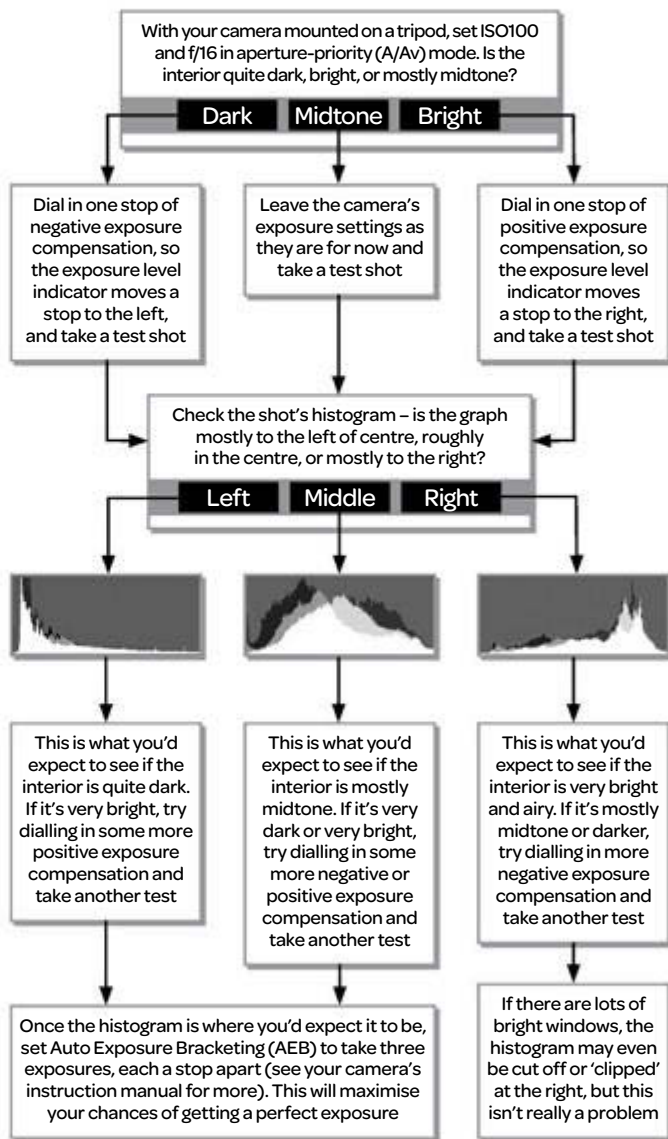
If you decide to include pedestrians in your image, or if there's simply no way of keeping them out of shot, you need to set a slow shutter speed to blur them slightly – if they're sharp, there's the risk that they, rather than the building, will end up becoming the focus of your image.



Interior exposure

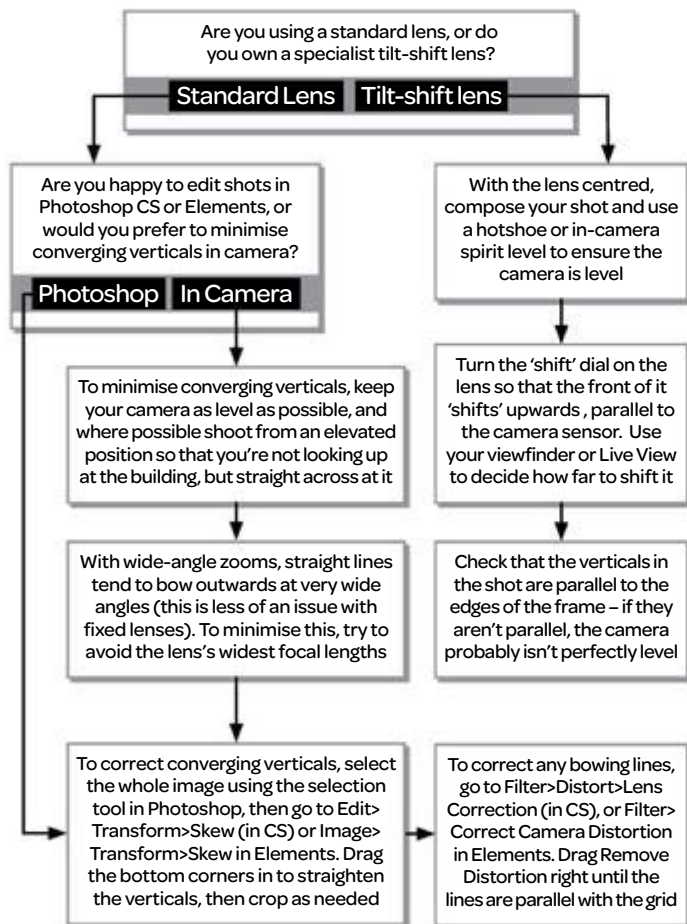
For interiors, similar rules apply, but there's not much you can do about bright windows!

As with landscape shots, when you're shooting architecture you generally want your scene to be as sharp as possible from front to back. The best way to ensure this, of course, is to set a small aperture to provide a decent depth of field, but that's not to say you should set the lens's smallest aperture. This is because at very narrow apertures, light rays passing through the lens are diffracted by the edges of the aperture opening. This results in a softening of the image, even at the point of focus. Because of this, most architecture pros tend to use an aperture of around f/14 or f/16 rather than f/22 or f/29.



Convergence

Converging verticals are hard to avoid, but there are ways of minimising them



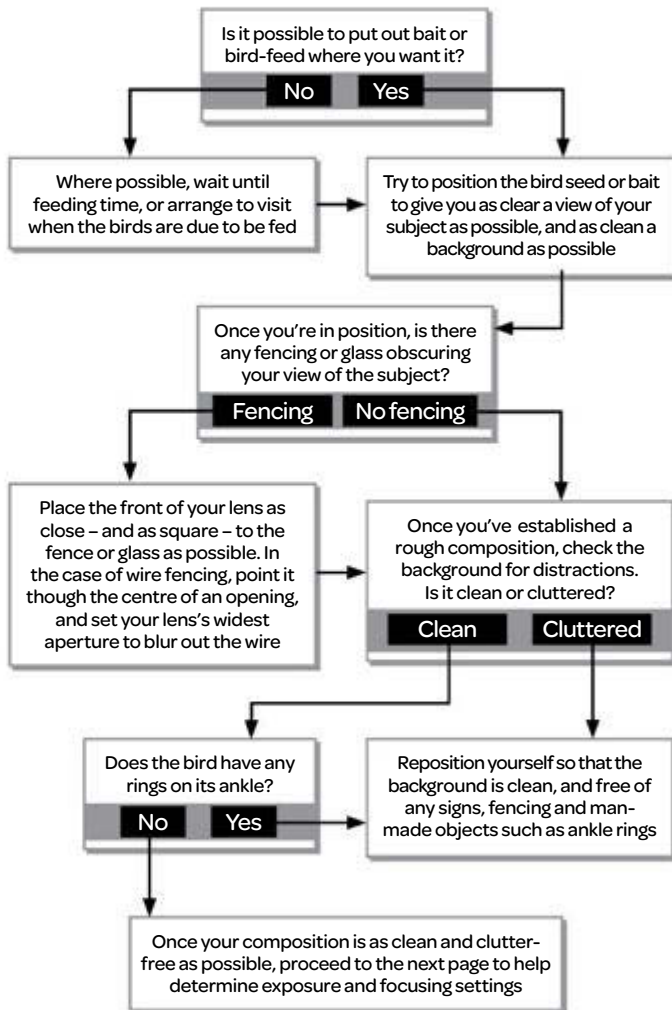
One of the biggest challenges facing the aspiring architectural photographer is ensuring that any verticals are actually vertical. If you shoot a building from straight on, all of the verticals will appear vertical, as the architect intended. If, however, you point your camera upwards – to get the top of a building in the frame, for example – the sides of the building will tend to lean in, or converge.

Captive birds

Bird centres are a great place to get started, but be aware of distracting backgrounds

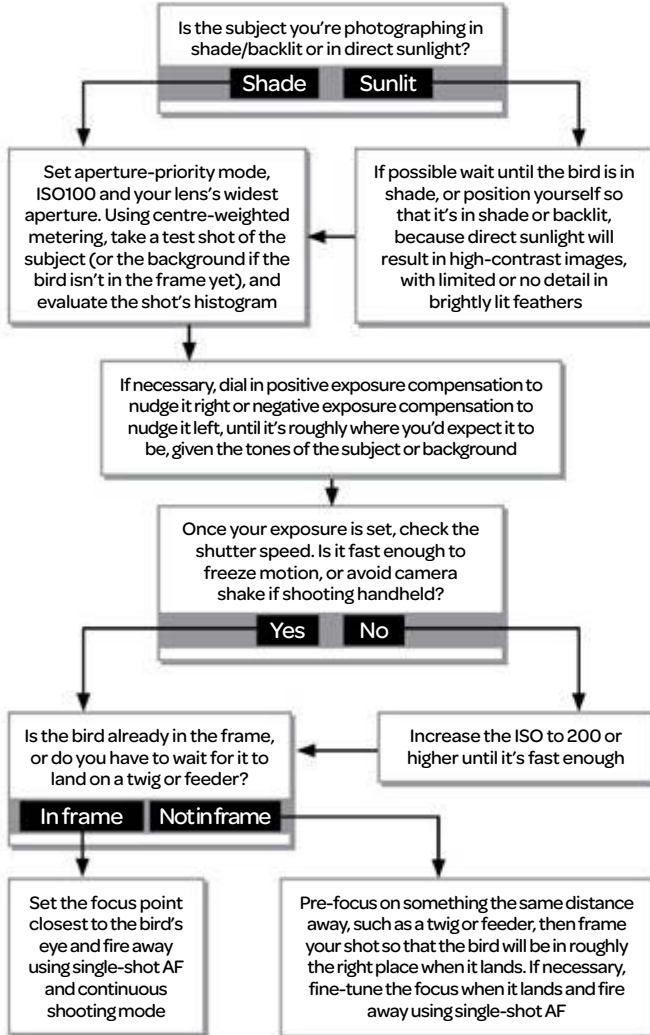


For those new to bird photography, the easiest place to start is a local aviary or bird of prey centre. While shooting captive birds isn't without its challenges, the obvious advantage is their behaviour is more predictable, especially at feeding time! Many bird of prey centres offer dedicated photography sessions, in which bait is placed in a pre-determined spot, enabling photographers to track birds as they swoop in for the kill. The next easiest option is to shoot birds in your garden, but this usually requires more preparation, both in terms of habituating birds to a feeder, and staying hidden while you're shooting.



Static birds

Make sure your subject is in shade or backlit to bring out feather detail

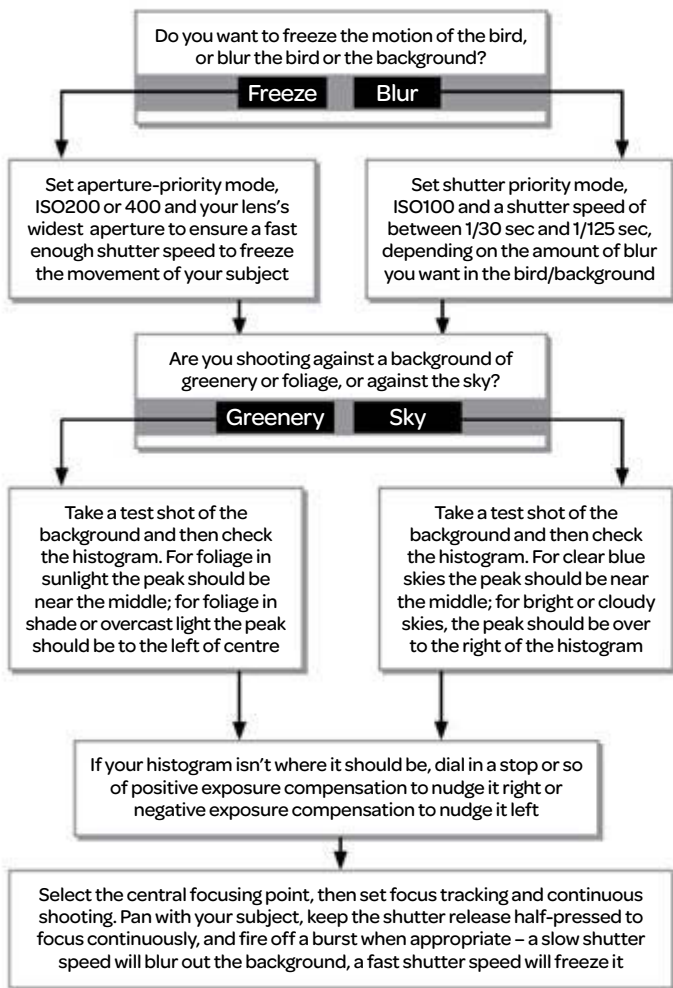


Unless you're shooting very large birds, or large flocks of birds, there's no getting around the fact that you're going to need a long lens to photograph them well.

Even if your chosen subject is very tame, or you're in a hide that's very close, you'll struggle to get frame-filling shots with anything shorter than a 300mm telephoto lens, and even at 300mm you'll have your work cut out.

Flying birds

Capturing birds in flight isn't as hard as it sounds – you just need the right settings



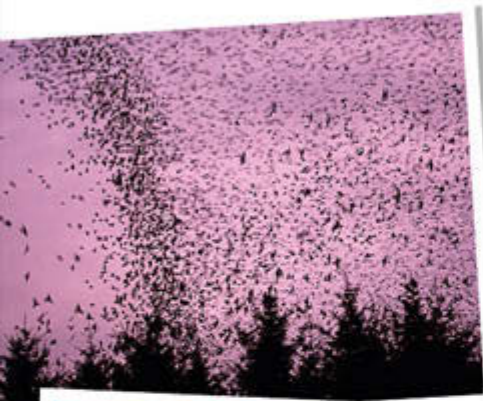
Most of the time you'll want to blur the background as much as possible to

minimise any distractions and make the subject stand out. The way to achieve this is to set as wide an aperture as possible – the wider the aperture, the softer the background. Setting a wide aperture also has the added bonus of allowing

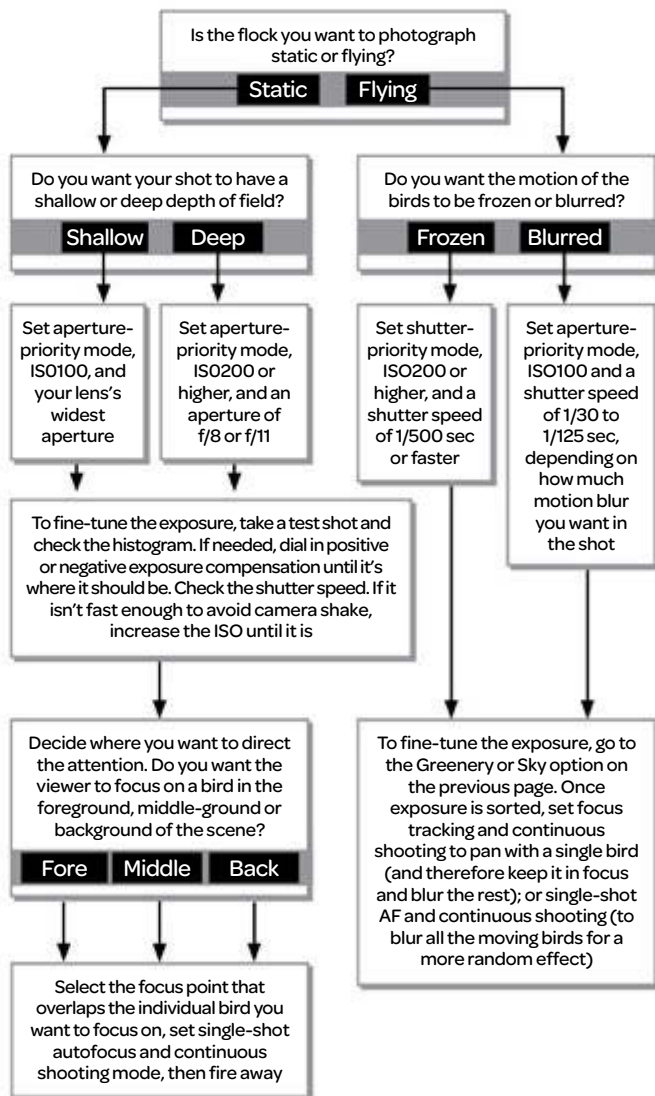
you to shoot at fast shutter speeds, because the wider the aperture, the faster the shutter speed can be. When shooting handheld, you should aim for a shutter speed that's faster than 1 over the effective focal length of the lens you're using. Don't forget to include the crop factor!

Flocks of birds

With groups of birds, try getting creative with depth of field and motion blur

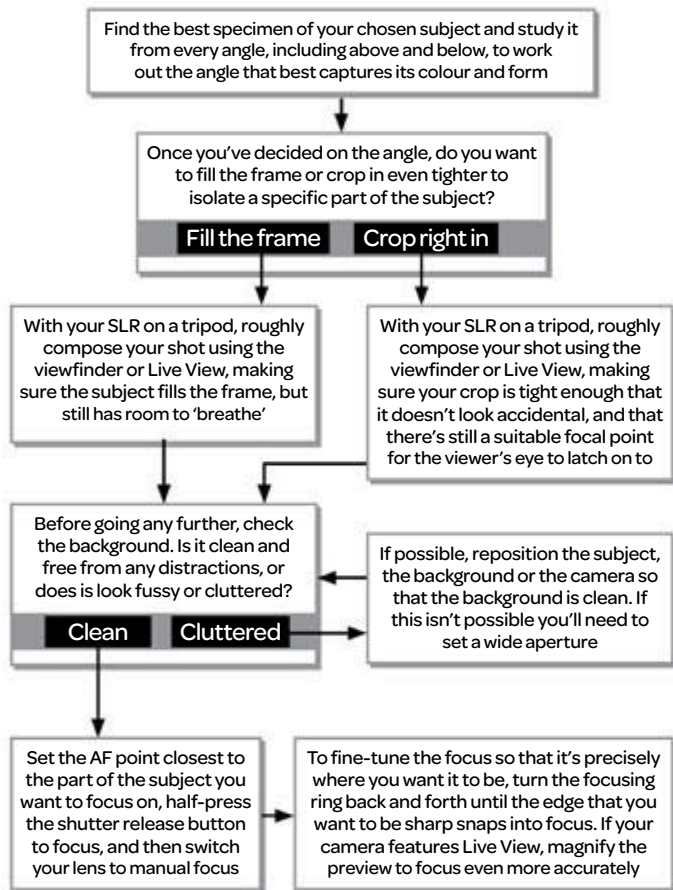


The only time when you may want a narrower aperture is when you want to maximise depth of field – if shooting flocks of birds, for example. Similarly, the one time when you may want a slow shutter speed is when you're panning (to blur the background), or when you want to blur the motion of the bird itself. Exposure-wise, spot or centre-weighted metering works well for subjects that are backlit.



Composition

When it comes to composition, the essential ingredients are angle, crop and background



Direct sunlight can help make colours sing in landscape images, but when it comes to close-ups, it's often more of a hindrance than a help. This is

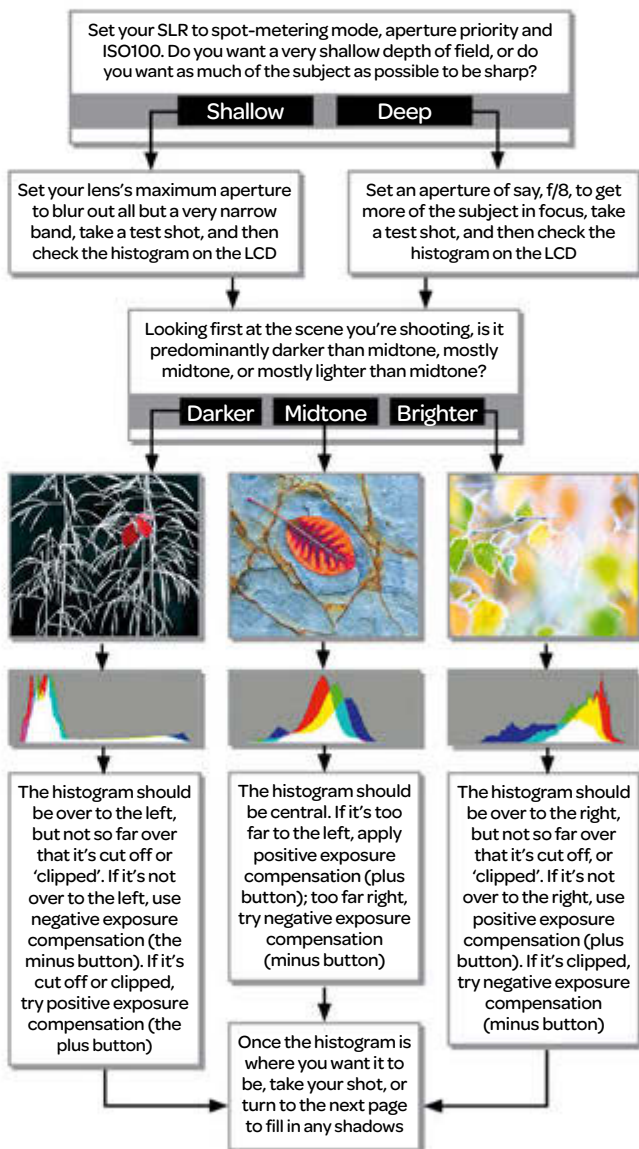
because direct sunlight tends to produce bright highlights and harsh shadows. This is fine if you want to, say, emphasise the texture of bark, but not if you want to bring out the details of leaves and berries. Once you've got the right conditions, the next important consideration is composition. The trick is to think of a macro shoot in much the same way as you would a portrait shoot, and to try to capture the character or personality of your subject.

Exposure

Knowing how to read a shot's histogram is the key to getting spot-on exposures



Exposure is best evaluated using the histogram. Macro images often have backgrounds that are darker or lighter than the subject, so if this is the case, set spot-metering mode, and tweak exposure compensation. The background is every bit as important as the subject you're shooting, and this is where many macro shooters come unstuck – it's so easy to miss a cluttered, distracting background.

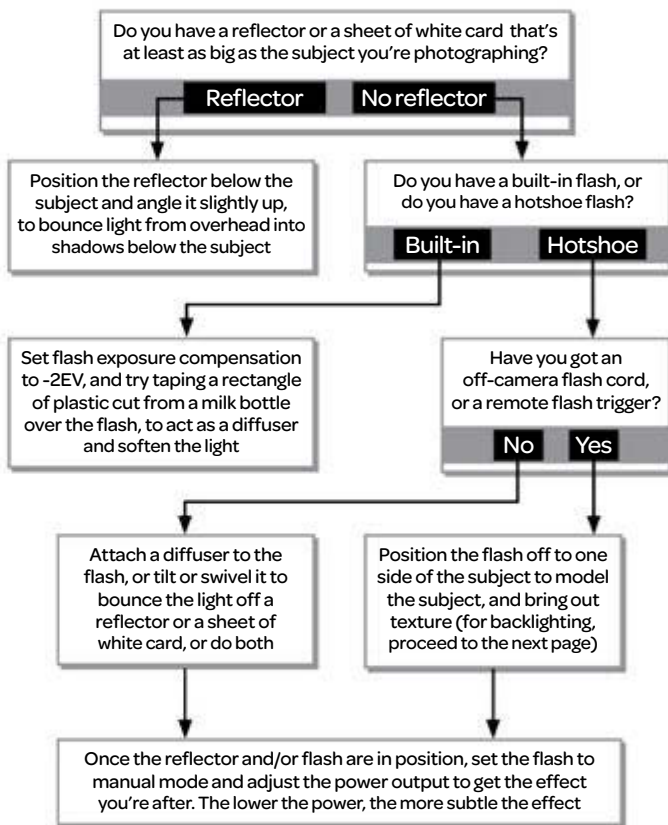


Lighting

A reflector or a burst of fill-flash can help to give your macro images added punch

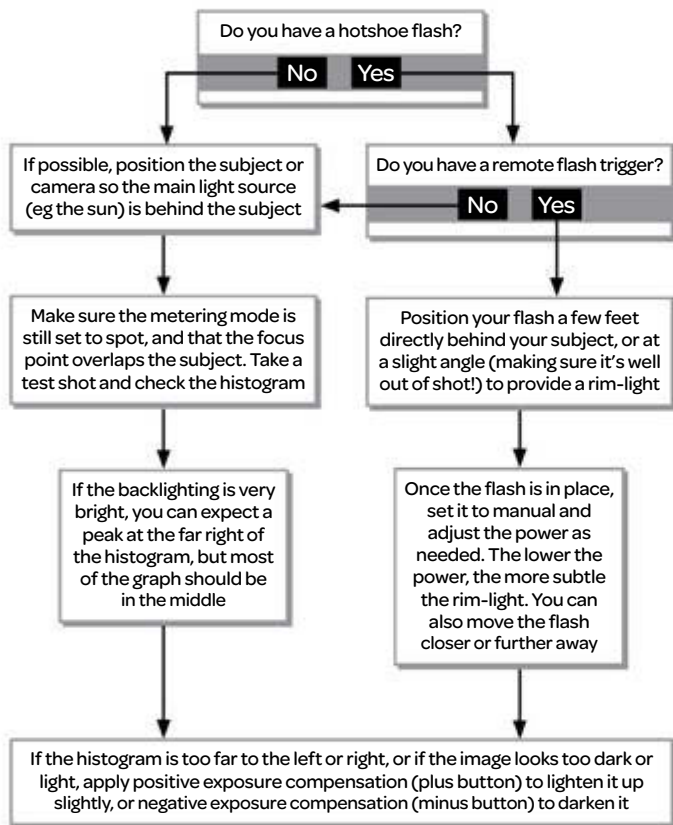


When you're shooting close-ups, the most important setting is usually aperture: if you only want a tiny fraction of your subject to be in focus, with everything else blurred, you'll need to set a very wide aperture; if you'd rather have more of the subject in focus, you'll need to set a narrower aperture. The temptation is to set as wide an aperture as possible as a matter of course, but if you're shooting close-ups, depth of field is so limited that even at relatively narrow apertures such as f/11 or f/16 the background will still be blurred, and much of the subject may be blurred.



Backlighting

Position a light source behind your subject to add a striking rim-light

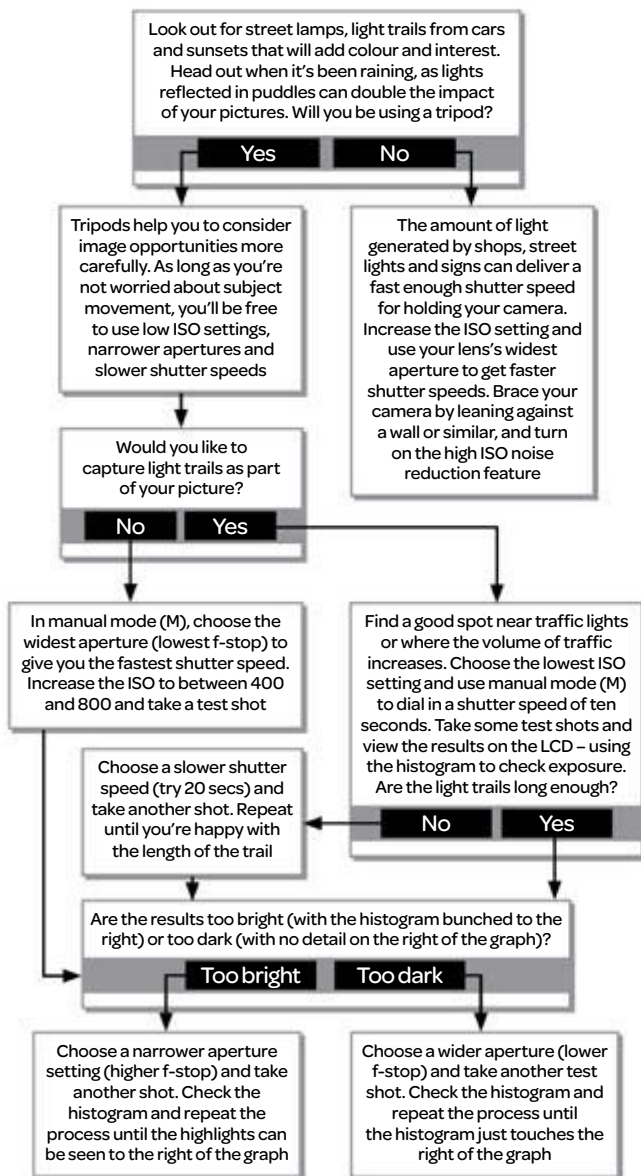


Set your camera's optimum ISO (100 or 200) for every shot, safe in the knowledge that you won't have to worry about camera shake. If you're holding the camera, you may need to bump up the ISO to 400 or above, and this will inevitably result in more grainy images. When it comes to focusing, autofocus is fine as far as it goes, but at very close range, macro lenses have a tendency to hunt for a focus point, and will sometimes fail to focus. The answer is to switch to manual.



Night city scenes

How to use long exposures after dark to capture colourful light trails in your images



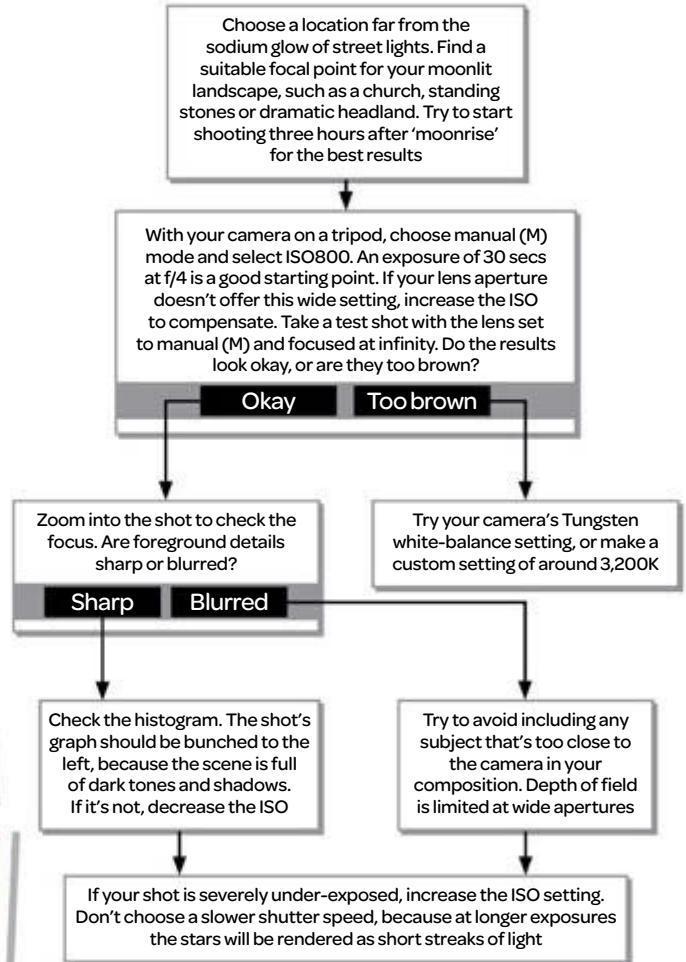
Getting great low-light pictures means applying the same attention to light and composition as you do in daylight. But before you head out into the night, it will pay dividends and save you time later if you plan ahead. Pick good locations beforehand by scouting out local spots that have interesting lights and architecture, or if you're looking to shoot traffic light trails, check which roads are busiest, when is the best time for traffic, and which is the best (and safest) position to take your photos from. Don't forget to check the weather forecast beforehand as well!

Moonlit landscapes

Give your scenic shots a magical twist by shooting them under the stars

Carefully study the scene before you start taking photos. Are some parts in complete darkness?

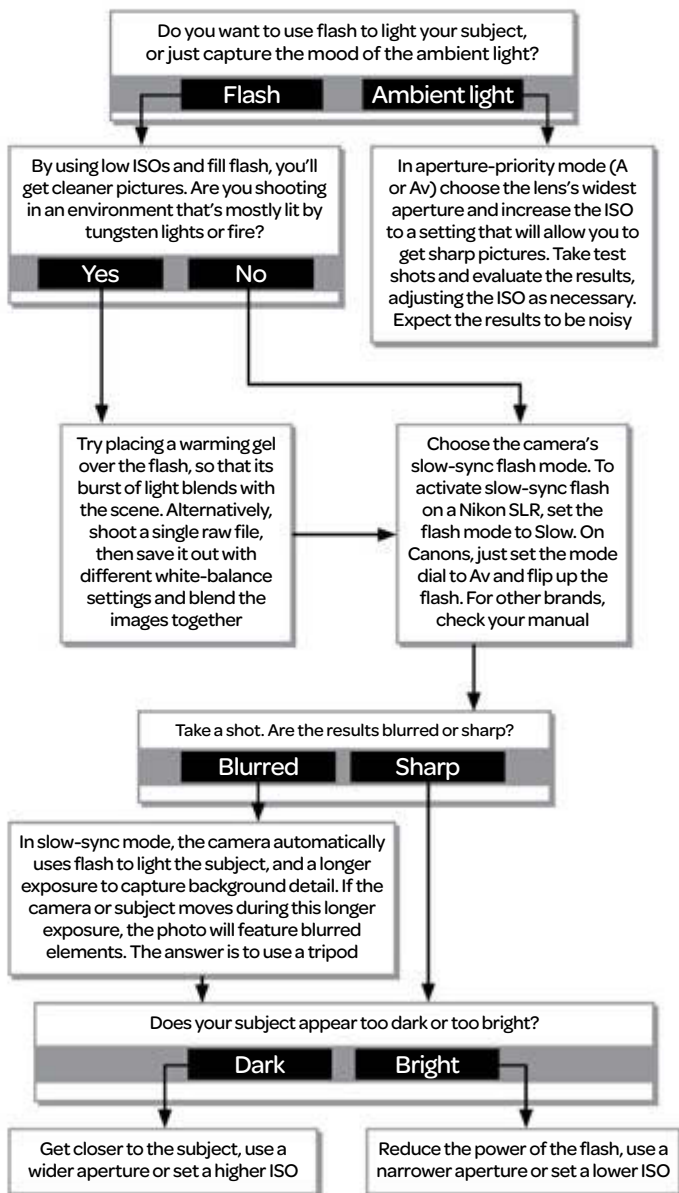
Do areas of the shot become more interesting, brightly lit or colourful as it gets darker? If so, don't be afraid to zoom in on the most photogenic areas. If you're shooting landscapes, arrive at the location with plenty of time to set up. The best pictures are often taken when there's still some light left in the sky.



Portraits

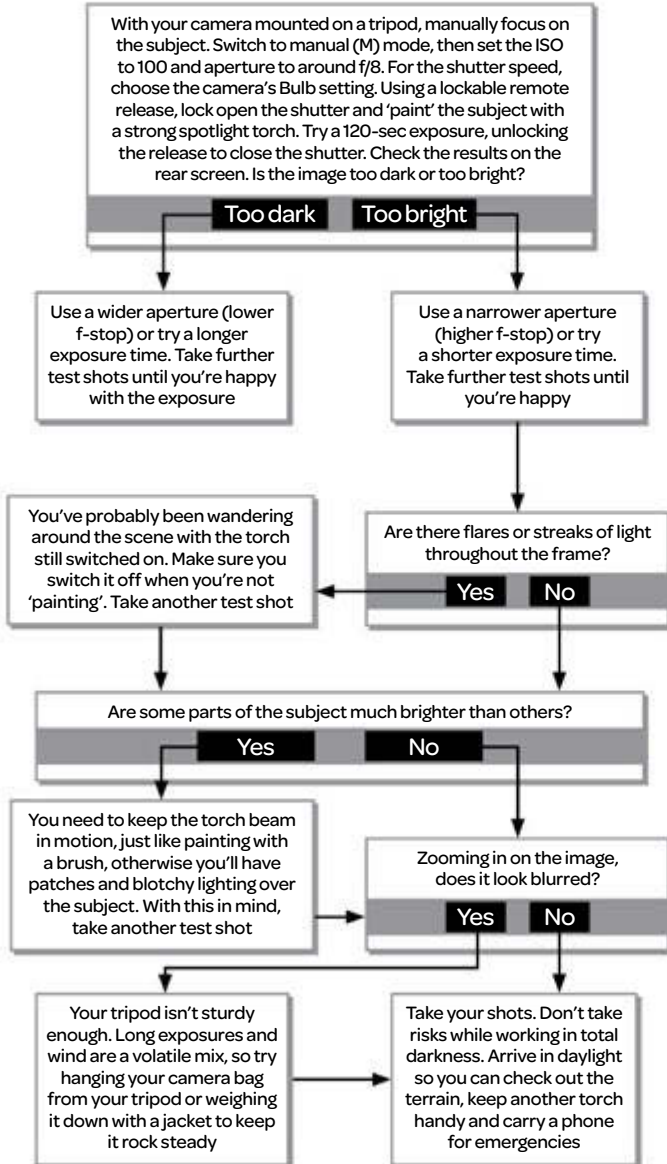
The flash settings and techniques you need to get well-lit pictures of people at night

For the best results, shoot in raw. This way your images will retain the most 'information', which gives you greater scope for enhancing your shots in Adobe Camera Raw and other raw-processing software. Raw is especially beneficial when taking night shots, because it gives more flexibility when you want to change things such as colour temperature, or brighten or darken your exposures. You might be tempted to increase the ISO to access faster shutter speeds, but you'll get the cleanest pictures if you stick to a setting of around ISO100-200. If you move to higher settings, your pictures will suffer.



Light painting

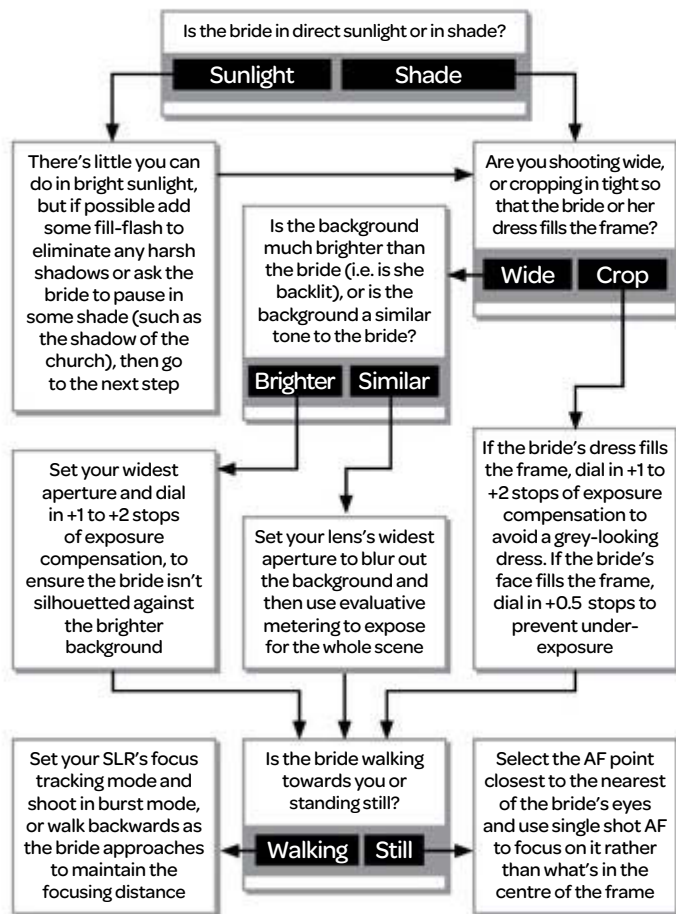
Grab a torch and get creative – ‘painting’ your subjects for dramatic effects



Choose a tripod with a sturdy set of legs and a rock-solid head. Padded leg wraps (or pipe insulation trimmed to size) make tripods more comfortable to carry and use in cold weather. A torch won't cost you much, but can help cut down on time spent hunting for equipment in the dark. It will also allow you to check your settings without having to activate your camera's rear or top-plate LCD.

The bride's arrival

Exposure compensation is the key to ensuring that the bride and her dress look their very best



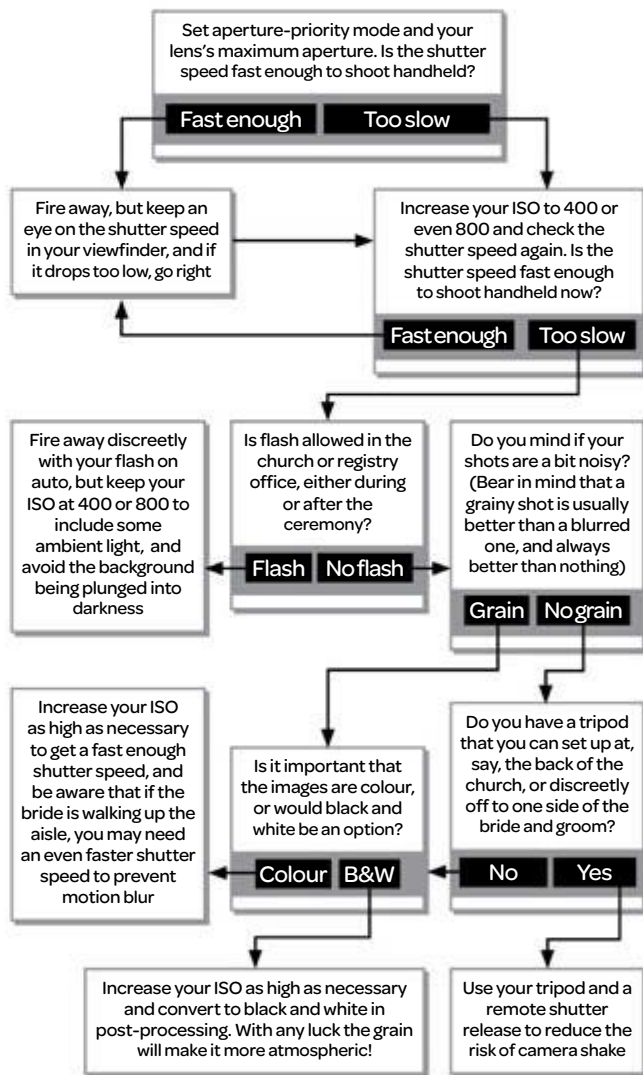
Whether you're just a friend who's been asked to be the 'unofficial' wedding photographer, or an aspiring pro who's been asked to shoot the whole wedding, it's vital to spend some time with the bride and groom well before the big day.

This is important because it enables you to get an idea of what they expect, and to manage those expectations. If you prefer to shoot reportage-style images and they want you to plough through a long list of formal group shots, this is the time to address it. A pro photographer can do both, of course, but even established pros have their own style.

Inside the church

To ensure sharp shots inside a gloomy church you're going to have to bump up your camera's ISO or use a tripod

Arguably just as important as meeting the bride and groom is visiting their chosen venue or venues, preferably at the same time of day as the wedding is due to take place. This will give you a chance to experiment with different settings and to check what will work and what won't. Will the bride be in direct sunlight when she arrives? Will there be enough light in the church to shoot handheld?

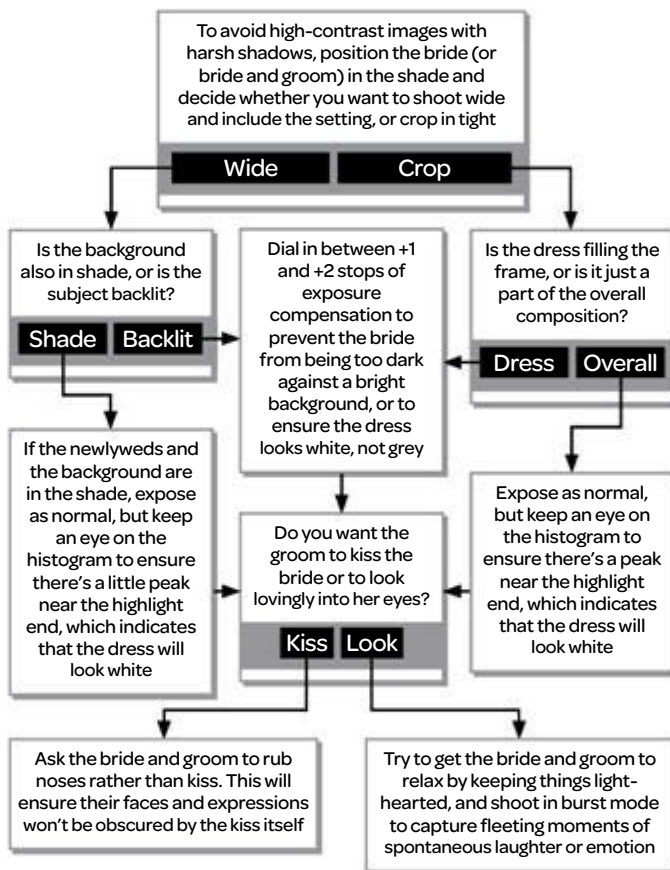


The bride and groom

As with the bride arriving, exposure is key, but just as important is capturing a moment between the bride and groom

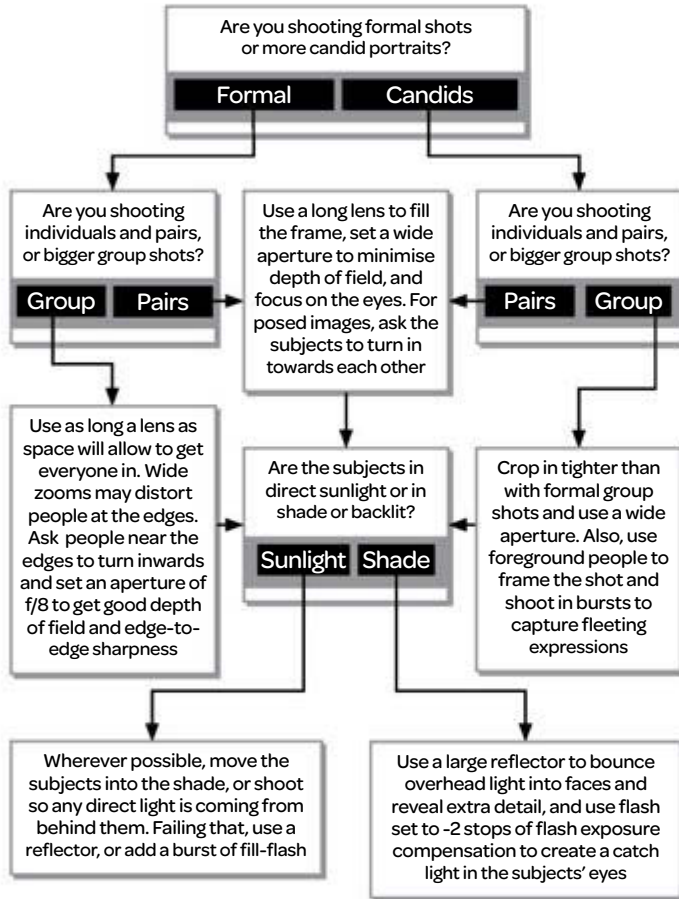
No matter what the bride and groom's expectations are, there are certain key moments throughout the day they're sure to want images of. When you find a set of images you like, try to work out what it is about them that appeals, and print a contact sheet of thumbnails to give you inspiration on the day.

But with the bride and groom, you have more time to be creative. Try to find somewhere shaded and quiet, away from the other guests, where they can stroll, pose and gaze at each other. This can bring on a fit of giggles, which can make for a natural-looking shot.



Family and friends

Formal shots and candids require a different approach, but taking control of depth of field is the key with both



Shooting outdoors is always a challenge. The key is to be discreet (turn off any autofocus beep, for instance), and don't be afraid to bump the ISO right up if you need to; better a grainy shot than an indistinct blur. Ask the best man to take charge of organising the various groups that need to be photographed. Shoot in burst mode to maximise your chances of getting a shot without anyone blinking.

CHAPTER 5

The complete dictionary of photography

The ultimate guide to photographic
jargon and acronyms

A

Aberration

An optical fault in a lens that creates a less-than-perfect image.

Abstract

In photography, this term refers to images that concentrate on aspects of a subject such as shape, form, colour and texture, instead of a straightforward representation of a subject.

Adams, Ansel

Adams (1902-1984) was an influential American photographer, acclaimed for his black-and-white landscapes of the American West, and particularly Yosemite National Park. Together with Fred Archer, he formulated the Zone System as a way to determine the optimum exposure for a negative.

Adobe Camera Raw

A plugin included with Photoshop and Photoshop Elements that enables users to process and edit raw files. Adobe Camera Raw is frequently updated to support the newest camera models.

AE

An abbreviation for automatic exposure. This camera feature enables the user to determine the shutter speed and aperture for an image, usually via a TTL (through-the-lens) exposure meter.

AEL

Automatic exposure lock. This is a push-button control that enables you to select the part of the scene from which the camera takes its meter reading, and then lock this setting while the image is re-framed for better composition. The button can also be used for focusing.

AF

Stands for autofocus, a function first introduced on cameras in the late 1970s, in which the lens is adjusted automatically to bring the designated part of the image into sharp focus. Almost all modern lenses for digital SLRs have AF, which is achieved via one or more sensors and a motor either integrated in the lens itself or the camera body.

AF illuminator

This is a system used by some cameras and flashguns to assist autofocus operation in poor light. A pattern of red light is projected on to the subject, which aids the contrast-detection autofocus to adjust the lens correctly.

AF-S

This stands for 'autofocus-silent', and refers to Nikon lenses that use a silent motor to control the autofocus system.

AL

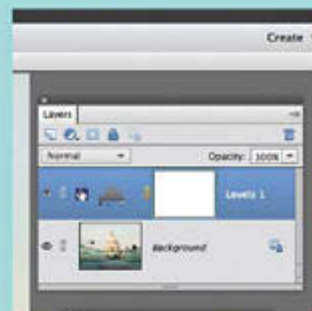
See aspherical lens.

Albumen print

A type of photographic print, invented in 1850 by Frenchman Louis Désiré Blanquart-Evrard (1802-1872). It consists of a sheet of paper coated in egg white (albumen) and salt, then dipped in a light-sensitive silver nitrate solution. The paper, when dried, is overlaid with a glass negative and exposed to the sun. The albumen print was widely used until the late 19th century.

Alternative processes

This term refers to a range of photographic processes, mostly dating from the late 19th and early 20th century, which devotees continue to use for their unique qualities. They include the daguerreotype, gum



Adjustment layer

This is a layer containing an image adjustment or effect instead of image content. Like a red Cellophane overlay on a print, an adjustment layer will alter the appearance of layers below it, but not actually alter their content, making adjustment layers a cornerstone of reversible, 'non-destructive' editing. The adjustment can be altered, hidden or removed at any point. When you add an adjustment layer, a mask is also automatically created, so that the effect can be applied to a lesser extent (or not at all) in particular areas of the image.

bichromate, cyanotype, salt print, bromoil, platinum and palladian processes.

Ambient light

The existing light in a particular scene, which may be sunlight, moonlight or an artificial light already providing illumination. It excludes any light source added by the photographer, such as flash or studio lighting.

Angle of view

A measurement of how much a lens can see of a scene from a particular position, usually measured in degrees. The longer the focal length of the lens, the narrower the angle of view. Zoom lenses have adjustable angles of view.

Antialiasing

A method of smoothing diagonal or curved lines in digital images to avoid a 'staircase' or 'stepped' appearance (also called 'jaggies'), caused by the fact that the pixels making up an image are discrete blocks of colour.

Aperture priority

Semi-automatic exposure system, where the aperture is set by the photographer. The shutter speed is then set by the camera to suit the light level reading taken by the camera's own meter.

APO

Abbreviation of apochromatic. This is used to describe Sigma lenses that use super-low dispersion (SLD) lens elements to reduce chromatic aberration.

APS

The initials of the Advanced Photo System, a short-lived film photography format introduced by Kodak and other manufacturers in 1996. The 24mm film

was housed in a drop-in cartridge, and could be shot in three different formats. It was mainly used in compact cameras, but also a small number of SLRs.

APS-C

This refers to the size of sensor used in some digital cameras, measuring around 22.5x15mm, and with a 3:2 aspect ratio. It gets its name and dimensions from the APS (Advanced Photo System) film format, used in its Classic (C) aspect ratio.

Artefacts

Flaws in an image caused by limitations in the recording or manipulation process. Examples include colour and tonal banding, random blotches or a mottled, grainy appearance.

ASA

A method of measuring and specifying film speed, or a film's sensitivity to light, as devised by the American Standards Association in 1943. It was replaced by the ISO (International Organisation for Standardisation) film speed system in the 1980s. Also, see ISO.

AS and Asp

Abbreviations for aspherical. See aspherical lens.

Aspect ratio

The relationship between the width and height of a picture, which describe the proportions of an image format or a photograph. The aspect ratio of most D-SLRs is 3:2, while on most other digital cameras, it's 4:3.

Aspherical lens

A lens element that has a surface that isn't perfectly spherical. All camera lenses are made up of a number of individual

lenses or elements. Many of these elements are spherical, as if cut from a sphere. Aspherical elements are less rounded and are used in wide-angle and wide-apertured lenses to help provide distortion-free images.

Astrophotography

Photography achieved by attaching a camera to a telescope, and concerned with recording images of astronomical objects in the night sky such as stars, planets, comets, and the moon. Astrophotography can also be used to record astronomical objects invisible to the human eye by using long exposures.

AT-X

Stands for Advanced Technology Extra – the branding used on all current Tokina lenses.

Autobracketing

A feature on some cameras that enables you to automatically shoot a sequence of shots of the same scene at slightly different shutter speeds (or aperture settings) from the 'correct exposure'. This feature can be used if there's some doubt that the meter reading is accurate for a particular subject. It can also be used to shoot a sequence that's combined into one high dynamic range image. See HDR. Other autobracketing features available on some cameras include automatic flash, ISO or white balance bracketing.

Autochrome

The name of the first colour photography process, invented by French brothers Auguste and Louis Lumière, and patented in 1903. A glass plate was coated in microscopic grains of potato starch, coloured red, green and blue, overlaid with a black-and-white silver halide emulsion.

The process was widely used until Kodachrome and Agfacolor films were introduced in the 1930s.

Autofocus

See AF.

Available light

See ambient light.

Avedon, Richard

Avedon (1923-2004) was one of America's most famous fashion and portrait photographers. He was the chief photographer for Harper's Bazaar magazine in the 1940s and Vogue from the 1960s. His portraits are famous for their intimacy as well as their stark and minimalist quality.

AWB

Automatic white balance. This is a system that automatically adjusts the colour balance of an image, according to the colour temperature of the light source, to make it look as natural as possible to the human eye.

B

B (Bulb)

A shutter speed setting that enables you to keep the shutter open for as long as the shutter release is held down, usually with a remote release. It's used for long exposures of up to several minutes.

Backlighting

An image is backlit when the light source is on the far side of the subject in relation to the camera. It means that there's more light coming from behind the subject than is directly on the subject itself. It's often used to separate the subject from the background to make a subject more

dramatic, or to make a silhouette or rim-lighting effect.

Backup

A copy of a digital file that's kept in case of damage to, or loss of, the original digital image.

Ballhead

A type of tripod head in which the head mount, which holds the camera, is attached to a ball-and-socket joint. When the socket is tightened using the ball lock knob, it locks the head in place.

Barn doors

Four hinged doors fixed on the front of studio lights. The doors are used to modify the shape and direction of the light.

Barnack, Oskar

Barnack (1879-1936), an optical engineer and industrial designer, is known as 'the father of 35mm photography' for his work as the head of development at the Leitz camera company. He designed the first Leica camera, which went on sale in 1925, and introduced the 24 x 36mm format (now known as 35mm) for still photography.

Barrel distortion

Barrel distortion is a lens fault or aberration that causes straight, parallel lines in an image to bow outward, and is seen when shooting with wide-angle lenses. The wider the lens, the greater the distortion. The appearance is similar to the effect you'd see if an image was wrapped around a barrel. It can be corrected using post-capture software.

Beauty dish

A studio lighting device used to give a flattering effect in portrait and fashion photography. It consists of a large circular



Aperture

The opening in the lens that restricts how much light reaches the image sensor. In all but the most basic cameras, the size of the aperture is adjustable. The aperture setting used has an important role to play in both exposure and depth of field.

dish-shaped reflector, usually around 40-50cm in diameter, with a light source in the centre. The light usually has an opaque cover so that only the diffused light reflected from the dish reaches the subject.

Bellows

A concertinaed tube made of flexible, light-proof material that separates a lens from the camera body. Bellows were first used on very early cameras in the mid-19th century, and are still used on large-format equipment (such as the Ebony view cameras) today. They allow the plane of focus to be adjusted via a swing and tilt mechanism. Bellows are also used instead of extension rings on SLR cameras for making more finely adjustable macro images.

Bit

The basic unit from which any digital piece of data is made. Each bit has a value of either 0 or 1. The sizes of digital files are usually counted in bytes, which are each made up of eight bits.

Bit depth

The number of bits used to record the colour of a single pixel. Digital cameras usually use at least eight bits for each of the red, green, and blue channels, providing a 24-bit depth, and a possible 16,700,000 colours. Many digital SLRs offer higher bit depths when set to record in the raw shooting mode.

Black trinity

A derogatory name given by fashion and portrait photographer Norman Parkinson (1913-1990) to three photographers who emerged in the late 1950s and early 1960s: David Bailey (born 1938), Brian Duffy (1933-2010), and Terence Donovan (1936-1996). This trio worked in a more

relaxed and spontaneous style, and became the leading fashion and portrait photographers of the period.

Blending mode

Blending modes determine how the pixels in a layer interact with the underlying pixels on other layers instead of simply covering them. Some blending modes are much more useful for photo editing than others. Multiply is used to darken an image, and Screen to lighten it; Overlay and Soft Light boost contrast.

Blown out

Bright areas in a photo that are over-exposed are said to be blown out. They don't hold any detail and will be bleached white.

Bokeh

Derived from the Japanese word for 'blur', this term is used to describe the aesthetic quality of the blur in out-of-focus areas of a picture, or the lens creating them. Smooth, circular out-of-focus highlights are a feature of 'good bokeh'.

Bounding box

In Photoshop, a rectangular border around a selected part of an image that can be dragged to transform, rotate, scale or move a picture element.

Bracketing

A system for increasing the chances of getting the correct exposure by taking a sequence of pictures with a slightly different exposure setting for each. See autobracketing.

Brady, Mathew

Mathew Brady (1822-1896) was a pioneering American photographer, famous for his photographs of the

American Civil War and his portraits of prominent Americans, including Abraham Lincoln.

Brandt, Bill

Bill Brandt (1904-1983) was an important British photographer who began his career documenting the British class system in the 1930s. He went on to photograph London in the war years before bringing his unique style to landscapes, portraiture and finally abstract nudes.

Bridge camera

A camera that is claimed to bridge the gap between compacts and D-SLRs. They are similar in appearance and handling to small D-SLRs, but they have a fixed, usually 'superzoom' lens, with some models offering up to a 50x optical zoom. They are also usually a little smaller. Instead of a D-SLR's optical viewfinder, they have an electronic viewfinder.

Brightness range

This is the difference between the brightness of the brightest part of the subject and the brightness of the darkest part of the subject. Also known as Subject Brightness Range (SBR).

Bromoil

A photographic process in which prints made on silver bromide paper are chemically bleached and hardened before an oil pigment is applied. It was popular among Pictorialist photographers from its invention in 1907 until the 1930s.

Brownie

The name of a series of simple box cameras made by the Eastman Kodak company. The first Brownie went on sale in 1900, and was intended to make photography simpler and more affordable

for everyone. The cameras were named after the cartoon characters created by illustrator Palmer Cox.

Buffer

Temporary memory used by a digital SLR. The size of the buffer in a camera helps dictate the maximum burst rate, and the number of shots per burst. In general, the bigger the buffer, the longer the burst.

Burn tool

A tool that can be used to darken parts of an image selectively during digital image manipulation. The tool gets its name (and its hand-shaped icon) from 'burning-in', a traditional darkroom process in which parts of a print could be made darker by giving some areas of a print more exposure than others. Also, see Dodge tool.

Burst rate

The continuous shooting speed of a digital camera, which enables a sequence of images to be taken in rapid succession, measured in frames per second (fps). The rate can only be sustained for a certain number of shots.

Butterfly lighting

A technique for lighting portraits achieved by pointing the flash down towards the front of the face and creating a distinctive butterfly-shaped shadow under the nose. A reflector is used to soften the shadow. This technique is also known as 'Paramount lighting' after the movie studio's glamorous portraits from the 1930s.

Byte

The standard unit for measuring the memory capacity of digital storage devices. Each byte can have one of 256 different values, and is equal to eight bits. Also, see bit and bit depth.

C

Cable release

A mechanical or electronic device for firing a camera from a short distance away, without physically pressing the shutter release. It's often used as a way to minimise vibration when using a slow shutter speed and a camera support, such as a tripod.

Calibrator

A device used to standardise the colour and brightness of a computer monitor so that images can be accurately adjusted.

Calotype

One of the earliest photographic processes, announced by William Henry Fox Talbot (1800-1877) in 1841, in which a negative image was recorded on a sheet of translucent paper coated with light-sensitive chemicals. The earliest surviving example is an image of a window at Lacock Abbey, made in 1835. Using the process, multiple positive images could subsequently be produced by contact-printing the negative.

Camera shake

Blurring of the image caused by movement of the camera during the exposure. Handheld cameras are prone to camera shake, and the fastest available shutter speed needs to be used to reduce or eliminate the problem.

Camera trap

A remotely activated camera used for documenting the behaviour of wild animals in a natural environment without the photographer being present. The camera's shutter is usually triggered when an animal's movement is detected by an infrared or motion sensor.



Bounce flash

Indirect flash-lighting technique, where the flashgun is angled to bounce off a wall, ceiling, or other reflector. This scatters the illumination, creating a softer lighting effect.

Cameron, Julia Margaret

Julia Margaret Cameron (1815-1879) was a British photographer who made portraits of some of the major figures of the Victorian period as well as her relatives and friends. She was one of the first people to see photography as an artistic medium open to interpretation, rather than simply a mechanical process for recording reality. Her portraits often make a creative use of soft focus.

Canvas

A Photoshop term for the overall dimensions of the image file you are using. Like the canvas used for a painting, the Canvas may be the same size as the actual size of the picture, or it may be larger.

Canvas Size

The Canvas Size control enables you to increase the size of the canvas without affecting the pixels that make up the image itself. It can be used to add a border to a photo, for example, or to add a blank area into which more sky can be cloned.

Cartier-Bresson, Henri

Henri Cartier-Bresson (1908-2004) is regarded as one of the most influential reportage and street photographers. He was one of the co-founders of the Magnum Photos agency in 1947. He was one of the first to exploit the advantages of the Leica 35mm camera, and used it to capture brilliantly timed and composed images throughout his long career.

Cartridge film

A type of photographic film housed in a plastic cassette. Because it's light-tight, film can be loaded into a camera in daylight. 126 cartridge film was introduced by Kodak in 1963, followed by 110 film in 1972. Two later formats, Disc film and

APS film, used their own specially designed cartridges.

Catch light

A white highlight in the eye of the subject, which is a reflection of the light source. The shape, size and intensity of the highlight, as well as the number of highlights, will vary depending on the lighting setup.

CCD (Charge Coupled Device)

A type of imaging sensor commonly used in digital cameras, and an alternative to the CMOS sensor. See CMOS.

Centre-weighted

A type of built-in light metering system, provided as an option on some cameras. Centre-weighted meters measure light intensity across the entire image area, but bias the average in favour of light measured towards the centre of the frame. The system isn't foolproof; it's easier to predict when it will make an inappropriate reading than more sophisticated metering systems.

Channel mixer

A feature in Photoshop that enables you to adjust the red, green and blue channels to increase or decrease colour saturation, or to convert an image to monochrome.

Chiaroscuro

A term that originated in Renaissance art. It refers to a style of image that features a strong contrast between the light and dark areas of the picture.

Chimping

This is a short form of 'checking image preview'. It refers to the act of looking too frequently at your camera's LCD, rather than concentrating on the subject.

Chromatic aberration

A lens fault common in telephoto lenses in which different colours of white light are focused at slightly different distances, creating ugly coloured haloes around the edges of a photographic subject. Software can remove or reduce the effect.

Chromogenic film

A fine-grain photographic film that produces black-and-white images, but is processed using C41 colour chemistry.

Circular polariser

A type of polarising filter. Circular polarisers can be used with modern cameras without interfering with the operation of exposure metering and autofocus systems, unlike older and cheaper linear polarisers.

Clipping

Clipping occurs when the dark parts of an image become pure black or the light parts become pure white, so that image detail is lost in these areas. On a histogram, a clipped shadow or highlight is indicated by the graph being 'cut off' on the left-hand (shadows) or right-hand (highlights) side.

Clone Stamp

An image-editing tool that enables you to replace an area of the image with pixels taken from elsewhere in the image (or even another image). It's commonly used for removing blemishes and other unwanted objects from a picture.

Close-up lens

A filter-like accessory that fits on the front of the camera lens to magnify the image. This low-cost and lightweight macro accessory can be used on most types of cameras and lenses. Close-up lenses come in a variety of different strengths, usually measured in dioptres.

CMOS (Complementary Metal Oxide Semiconductor)

This is a type of imaging sensor used in digital cameras. Located at the focal plane, it converts the focused image into an electrical signal. It's similar in function to the CCD sensor.

CMYK

Cyan, magenta, yellow and black (or 'key'), the four primary inks used in commercial colour printing. CMYK also refers to the printing process itself.

Collodion process

This is an early technique for making photographic prints, invented by Frederick Scott Archer (1813-1857) in 1851, which used collodion (cellulose nitrate) to stick light-sensitive chemicals on the surface of a glass plate. The plate was exposed, developed and fixed while still wet. The process produced good results and was used widely until around 1880.

Colour channels

Every colour you see on a screen is created by a specific mix of red, green and blue light, and every printed colour by a specific formula of ink colours. In Photoshop, the component colours can be represented and seen as separate colour channels – RGB for most digital photos. See Channel mixer for more on this.

Colour filter array (CFA)

The pattern for red, green, and blue filters used over the photo sites in an imaging sensor. Usually, half the photo sites in a digital camera (which define pixels) have green filters, a quarter have red filters, and quarter have blue filters.

Colour management

An overall system that tries to ensure that

the colours of an image are displayed and output in exactly the same way, whatever the device being used.

Colour profile

Description of how a camera, printer, monitor or other device displays or records colour. It provides a universal way in which different devices can produce similar-looking results. This is sometimes known as an ICC profile, because the standards are set down by the ICC (International Colour Consortium).

Colour negative film

Film on which all original colours are recorded as their complementary colours. When the image is printed on photographic paper, the colours are again reversed to their original hue. Colour negatives have an orange tint or mask, which helps to control contrast and improves the reproduction quality.

Colour reversal film

Film processed to produce a colour positive image on its transparent base. Traditionally, images are mounted in card or plastic mounts. Also commonly known as slide or transparency film.

Colour space

The theoretical definition of the range of colours that can be displayed by a device.

Colour temperature

All light sources have a characteristic colour temperature: artificial (tungsten-filament) lights are warmer (more orange) than daylight, which is warm near dawn, turns cooler (more blue) during the day, then warms again at nightfall. Our eyes adjust for colour temperature much of the time without our realising it, so that colours look pretty consistent. Digital cameras can make



Colour cast

A colour tint in an image, caused by shooting in a particular kind of light. Tungsten light causes a yellow cast, while fluorescent light causes a green cast. Casts can be corrected using the camera's white balance feature, or at the post-capture stage.

electronic adjustments using a white balance system to neutralise colours. When they get it wrong (or you use the wrong white balance setting on your camera), a colour cast results.

Combination printing

The use of two or more negatives to make one print. The technique was first used in the mid-19th century to overcome exposure limitations in early photographic processes, although photographers such as Oscar Gustave Rejlander (1813-1875) could use dozens of images to make one epic scene.

Compact

A type of camera with a shutter mechanism built in to the lens. Compacts are generally point-and-shoot designs that are easy to carry around. Most digital compacts have built-in zoom lenses.

CompactFlash

This is a type of removable memory card commonly used in digital SLRs.

Complementary colours

Also known as 'opposite colours', these are pairs of colours that create a strong contrast. On the traditional colour wheel they are red/green, yellow/violet and blue/orange, while the CMYK and RGB models use red/cyan, green/magenta and blue/yellow.

Compression

The process of reducing the sizes of files such as digital images, so that they use less storage capacity and are faster to upload and download. See lossless compression and lossy compression.

Contact print/sheet

Contact prints are photographic images

made by laying one or more film negatives on a sheet of photographic paper, usually under a sheet of glass, and exposing it to light. In the traditional wet darkroom, a contact sheet is usually the first stage of printing an image.

Continuous autofocus

This is an autofocus setting in which the focus is constantly adjusted until the shutter is actually fired. It's especially useful for moving subjects such as in wildlife or sports/action photography, where it would be unhelpful for the focus distance to be locked as soon as it's initially found.

Continuous lighting

Lighting that remains on throughout a photo shoot, as opposed to the brief burst of illumination given by flash or strobe lighting.

Contrast-detection autofocus

See passive autofocus.

Contrast range

A measurement of the difference in brightness between the very darkest and lightest parts of an image. See brightness range.

Contre-jour

In French, literally 'against the light'. See backlighting.

Converging verticals

A term used to describe the effect of parallel lines getting closer together, particularly the two sides of a building, or a section of a building, when shooting from a low angle of view. The phenomena occurs when the camera is tilted up or down to fit the entire building in the picture.

Crop

To remove unwanted parts of an image.

Crop factor

Sensors of several different sizes are used in digital SLRs, and this size affects the angle of view offered by a particular lens. The smaller the sensor, the narrower the angle of view. The 'crop factor' is to convert the actual focal length of a lens to the effective focal length (EFL – see below). The crop factor for Four Thirds and Micro Four Thirds models is 2x; the crop factor for most popular digital SLRs (DX and APS-C) is 1.5x or 1.6x. Full-frame digital SLRs need no focal length conversion, so they have a crop factor of 1x.

Cross-processing

Sometimes called 'X-Pro', in film photography this refers to processing colour negative film in reversal film (E6) chemicals, or colour reversal film in negative film (C41) chemicals. The resulting colour shifts gave images a distinctive look. The technique was once especially popular in fashion photography. A similar appearance can be created in Photoshop by boosting contrast and tweaking colour channels.

Curves

This powerful Photoshop feature enables you to adjust the exposure and contrast of an image. By altering the shape of the curve, different areas of tone can be lightened or darkened by varying amounts. By altering the curves for each of the different colour channels, the colour balance of the image can also be altered to create special effects, or simply to correct for unwanted colour casts. Elements' version of Curves, called Adjust Colour Curves, is more limited than Photoshop's Curves.

Cyanotype

A printing process that creates a distinctive cyan-blue print, discovered in 1842 by scientist Sir John Herschel (1792-1871). It was first used in photography by Anna Atkins (1799-1871), who produced a book of cyanotype photograms made using seaweed in 1843.

D

D

A type of Tokina lens that's compatible with full-frame SLRs.

DA

Stands for Digital Auto, which features on a range of Pentax lenses that (unlike some earlier ranges) don't have a manual aperture ring. They have a 'Quick Shift' mechanism that enables you to override focus manually, even when the lens is set to autofocus.

DA*

The premium lens range from Pentax, which combines weatherproofing with the advantages of the DA range.

Dark cloth

A sheet of black material, mainly used in large-format photography. It covers the photographer's head and the camera, and allows the relatively dim image on the ground-glass screen to be seen more clearly when composing and focusing an image.

Darkroom

A light-tight room for processing and printing traditional photographs. Negatives are loaded into the processing tank in complete darkness, while a red/orange safe light can be used at the printing stage.

Daguerre, Louis

Louis Daguerre (1787-1851) was an artist and inventor who devised one of the earliest photographic processes, the daguerreotype, announced in 1839. It was made by coating a silver-plated copper sheet with light-sensitive silver iodide, and exposing it in a camera to create a positive image.

DC

This features on the range of Sigma lenses that are designed specifically for use with crop-factor SLRs, and which can't be used with full-frame models.

Decisive moment

The split-second when all the elements of a photograph simultaneously come together. The decisive moment is associated with Cartier-Bresson, who described photography as "the simultaneous recognition, in a fraction of a second, of the significance of an event as well as of a precise organization of forms which give that event its proper expression."

Dedicated flashgun

A type of flashgun that's designed to provide direct one-way or two-way communication with the camera. The amount of dedication varies enormously depending on the flashgun and camera. Increased dedication tends to provide a more accurate flash metering, as well as making the flash system easier to use successfully.

Depth of field

A measure of how much of a picture is in focus, from the nearest point in the scene to the camera that looks sharp, to the furthestmost point that looks sharp. Depth of field is dependent on the aperture used,



Compact System Camera (CSC)

These are cameras with no mirror mechanism, and are therefore smaller and lighter than D-SLRs, but still offer similar controls, high-quality images and interchangeable lenses. Depending on the model, there's either an electronic viewfinder or no viewfinder and only the LCD screen. CSCs are also referred to as MILCs (mirrorless interchangeable lens camera) or EVILs (electronic viewfinder, interchangeable lens).

the distance that the lens is focused at, and the focal length of the lens.

Depth of field preview

A device, usually a button, found on some digital SLRs that enables you to see the viewfinder image at the actual aperture you'll be using for the exposure. This gives a visual indication as to how much depth of field there is, and which parts of the resulting picture will be sharp or blurred. This is necessary because the viewfinder normally only shows the image as it would appear if the widest aperture available were used.

Depth of field scale

A scale found on some lens barrels that can be used to work out the depth of field for particular apertures, and that can be used for manual focus adjustments to maximise or minimise the depth of field.

Depth program

A program exposure mode in which the aperture and shutter speed are set automatically in order to provide the maximum depth of field, while maintaining a shutter speed that's fast enough for hand-held photography. With some cameras, the different subject distances measured by the multipoint autofocus system are also taken into account, and the focus is adjusted to suit.

Developer

A mixture of chemicals used to convert or amplify a latent image on a photographic film or print to make it visible. It's made permanent using fixer.

DFA

This features on the range of Pentax lenses that will work with full-frame 35mm film cameras as well as crop-factor digital SLRs.

DG

This refers to the Sigma lens range suitable for full-frame SLRs (but that can also be used on crop-factor models).

Di

Tamron's 'Digitally Integrated' lenses have a full-size image circle, so they are suitable for full-frame and crop-factor SLRs.

Di II

Tamron's second-generation Digitally Integrated lenses are designed for use on popular crop-factor SLRs, and are not suitable for full-frame models.

Diaphragm

Another term for the aperture. These are the adjustable blades that regulate how much light enters the lens and reaches the sensor.

Dialog

A window that pops open when you select certain commands, usually to give you the opportunity to configure settings or enter further preferences. In Photoshop and Photoshop Elements, menu commands that will open a dialog for further instructions before applying their effect are usually indicated by an ellipsis (...) after the name, such as File>Save As... Those without this, such as File>Save, will work immediately, with no dialog.

Differential focusing

Controlling depth of field to ensure that one element in the picture is sharp, while others are as out of focus as possible.

Diffraction

Scattering of light caused by deflection at the edges of an opaque object. Diffraction causes slight fuzziness in the image when the narrowest apertures are used.

Diffuser

Any material that scatters the light as it passes through it, softening the illumination and making shadows less distinct. Diffusers are commonly used with artificial light sources such as strobes and flashguns. On sunny days, clouds act as natural diffusers.

Dioptre

Optical measurement used to describe the light-bending power of a lens. The dioptre value of a lens is equal to the number of times that its focal length will divide into 1000mm. Dioptres are used to measure the magnification of close-up lenses, and of viewfinder lenses.

Disc film

A short-lived format introduced by Kodak in 1982. The disc-shaped film, housed in a plastic cartridge, contained 15 negatives measuring 11x8 mm. After each exposure, the disc rotated to the next frame. Poor image quality made it unpopular, and it was discontinued in 1999.

DNG (Digital Negative)

DNG is a raw file format invented by Adobe and used by some camera manufacturers. An advantage of DNG is that, unlike other raw formats, it isn't specific to just one camera manufacturer or model, and it isn't just a read-only format – you can save your files in DNG format too. A free DNG converter application available from Adobe at www.adobe.com/products/dng enables you to convert any raw file into a DNG.

DO

Diffractional Optics is used on a handful of Canon telephoto lenses. The technology enables these long lenses to be made smaller and lighter than equivalents using conventional optical designs.

Dodge tool

A way of lightening selected areas of the image during digital manipulation. The tool gets its name (and its spoon-shaped icon) from the traditional darkroom technique of 'dodging', where parts of a print are shielded from exposure and therefore given less light than other parts. See also Burn tool.

Doughnuts

The name given to the ring-shaped bokeh created by the unique construction of a mirror lens.

DPI

Dots per inch. Strictly speaking, a measure of the density of dots of ink that a printer lays down on paper. Compare image resolution (density of pixels) of a print or on-screen image at a certain size, measured in pixels per inch.

DPOF

(Digital Print Order Format)

A facility available on some digital cameras that enables users to mark the images from which they wish to have prints made.

D-SLR

(digital single lens reflex)

See single-lens reflex.

DT

A Sony lens with a smaller image circle, designed for use on crop-factor cameras.

Duotone

A duotone image is one made from two inks (usually black and another colour), and is often used in printed books to increase the tonal range of an image. It's also used by some fine-art photographers to add subtle colour to black-and-white photographs. A similar appearance can be achieved in Photoshop

by converting a colour image to greyscale, then choosing Image>Mode>Duotone.

DX

Tokina's and Nikon's way of marking lenses that are only suitable for crop-factor (or APS-C) digital SLRs.

Dynamic range

A term used to describe the range between the lightest and darkest points in a photograph. The range that can be recorded by a digital camera is relatively small compared with the range that the human eye can perceive.

E

Eastman, George

George Eastman (1854-1932) was an American entrepreneur and philanthropist. He patented the first paper negative roll film in 1884 before establishing Eastman Kodak in 1892, which went on to become one of the world's largest photographic companies. The popular Kodak 'Brownie' series was launched in 1900, with the famous slogan, 'You push the button, we do the rest'.

ED

A lens featuring Extra-low Dispersion glass in one or more of its elements, to help correct chromatic aberration. This abbreviation is used by Nikon, Panasonic, Olympus and others.

Edgerton, Harold Eugene

Harold Eugene Edgerton (1903-1990) was a professor of electrical engineering at Massachusetts Institute of Technology, who conducted innovative experiments with high-speed flash photography. He developed a flash tube that fired for



Dioptic correction

The facility provided on some digital cameras for adjusting the viewfinder to suit the user's eyesight. Limited adjustment is built-in, and some cameras permit further modification with the use of additional dioptre lenses.

one-millionth of a second, recording for the first time subjects such as a bullet piercing an apple.

EF

Stands for Electro Focus. This is the name of the lens mount Canon introduced on its first autofocus SLR cameras in 1987. EF lenses can be used on all Canon SLRs.

Effects filter

See filter.

EFL

(effective focal length)

A measure for comparing the angle of view and magnification of different lenses and lens settings, whatever the size of imaging chip being used. The actual focal length is converted to the equivalent focal length that would give the same angle of view on a camera using 35mm. See focal length.

EF-S

Stands for Electro Focus Short back focus, a lens mount introduced by Canon in 2003. EF-S lenses have a small image circle so they are only suitable for use on crop-factor SLRs. A modified mount means that they can't physically be fitted onto incompatible (i.e. full-frame) Canon models.

EX

Sigma's designation for its premium lens range.

Element

An individual optical lens. Most photographic lenses are constructed using a number of lens elements, placed parallel to each other along a single axis. Some are placed together in groups.

Enlarger

A projector used in a traditional wet

darkroom. Negatives are placed in the carrier, and a light inside the enlarger head projects the magnified image onto a sheet of photographic paper on the baseboard. When the exposure is complete, the photograph is developed and fixed.

Environmental portrait

A portrait shot in a subject's home or work environment in such a way that it gives an insight into the subject's character. The American photographer Arnold Newman (1918-2006) is considered the father of environmental portraiture.

EV (exposure value)

The scale used to denote the exposure required without the need to specify either shutter speed or aperture. A particular EV setting has its own set pairs of possible shutter speed and aperture. Exposure values are often quoted in combination with an ISO speed to denote a specific light level.

Evaluative metering

A metering system used on many cameras, in which light readings are taken from a number of different areas, or zones, across the image. These readings are then compared to data programmed into the camera, so it can work out an appropriate exposure setting. Information from the multipoint autofocus system is also used, to ascertain the likely position of the subject. This 'intelligent' metering system can avoid many of the failings of simpler systems. However, it's impossible to second-guess, so it can be difficult to predict the occasions where it will get the exposure wrong. It's also known as matrix metering.

EVF (electronic viewfinder)

An eye-level LCD screen, as found on

hybrid cameras, bridge cameras, camcorders, and some compacts. The image seen by the lens is electronically projected onto the screen.

EVIL (electronic viewfinder, interchangeable lens)

A type of hybrid camera that combines features of a traditional SLR with those of a compact camera. Unlike a digital SLR, this type of camera has an electronic rather than optical viewfinder. See compact system camera.

EXIF

(exchangeable image file)

Camera settings recorded by many digital cameras as part of the image file. This data automatically notes a wide range of information about the picture, including the date and time it was recorded, aperture, shutter speed, model of camera, whether flash was used, number of pixels used, metering mode, exposure mode, exposure compensation used and zoom setting. The information can then subsequently be read by suitable software. To access this information in Photoshop and Photoshop Elements, go to File>File Info.

Exposure

The total amount of light used to create an image. The term is also used to describe a single shutter cycle, that is, the process of the camera's shutter opening, closing and resetting.

Exposure compensation

A control for manually overriding the built-in exposure meter of a camera to provide more or less light to the sensor.

Eyedropper

A Photoshop tool used to sample the colour of an area, typically changing the

foreground colour to the same shade. It can also be used in some adjustment tools for setting exposure or colour balance, by clicking a particular area of tone as a reference point.

Eye relief

A measurement of the optimum viewing distance between the photographer's eye and the camera's viewfinder.

Eyepiece correction

See dioptic correction.

F

F-stop

The aperture setting on a lens. The number is the focal length of the lens divided by the diameter of the aperture. As a result, larger f-stop numbers represent narrower aperture sizes. F-stop numbers are used so that exposure settings for a particular scene can be expressed without having to know the focal length of the lens used. The term, F-stop, comes from the Waterhouse stop (a series of circular holes in strips of metal that 'stopped' some of the light passing through the lens). The system was invented by John Waterhouse (1806-1879) in 1858, but the hole sizes don't correspond with modern f-stop numbers.

f/x.x

The f-stop number is the size of the lens's maximum aperture, measured as a fraction of the focal length of the lens. On some zoom lenses there may be two apertures quoted: f/4-5.6, for example. This means that the maximum aperture of the lens gets narrower as the lens is zoomed in. The maximum aperture on the lens barrel may also be expressed as a ratio, such as 1:4-5.6.

FA

A Pentax lens that's compatible with full-frame SLRs, and that features an old-fashioned aperture ring.

False colour

A colour shown in a digital image that's different from the actual subject colour, and that often appears together with a moiré pattern. See moiré pattern.

Fast ISO setting

An ISO setting that makes the sensor more sensitive to light than usual, and thus requires less exposure than usual. Fast settings are useful in low-light situations where long shutter speeds are not suitable. A drawback is that grain-like noise within the image becomes more pronounced as the ISO speed is increased. See ISO.

Fast lens

A lens that has a wider maximum aperture than is usual for that particular focal length or zoom range, allowing a shorter shutter speed. Fast lenses are not only useful in low light; they can be invaluable for throwing backgrounds out of focus to a greater extent than usual.

Fast shutter speed

Relative term for an exposure that is shorter than average, usually set to avoid the blur that would otherwise be created by movement of the subject.

Feathering

A way of softening the edges of an area that you've selected to work on in Photoshop. It adds a transition zone of transparent pixels, which enables any background to partially show through (like with the edges of a feather). It's used so that the join between manipulated and non-manipulated areas is rendered less obvious.



Extension tube

An accessory used in macro and close-up photography that fits between the D-SLR body and the lens. The extra extension between the lens and sensor enables the lens to focus closer and to provide a higher image magnification than would otherwise be possible. Extension tubes are usually sold in sets of three, and are used singly or in combination to provide a total of seven different magnifications.

Fenton, Roger

Roger Fenton (1819-1869) was a British photographic pioneer who took some of the earliest war photographs on the battlefields of the Crimean War in 1854. He was also the founder and first secretary of The Photographic Society, later renamed to The Royal Photographic Society.

File format

The way in which a digital image is stored. When you've finished editing your images, you usually get a choice of formats to use while saving. Common file types include JPEG, TIFF, and PSD.

Fill light

In studio lighting, a fill light is used to give more detail to dark or shadow areas, and reduce contrast.

Film

In photography, film is a transparent plastic perforated strip or sheet that acts as a base for microscopic, light-sensitive silver halide crystals coated on one side with a gelatin emulsion. Black-and-white film has a single layer of silver salts, while colour film has a minimum of three layers of dye (blue, green and red), which sensitise the salts to different colours, as the scene being photographed dictates.

Filter

A general term used within Photoshop for a wide range of artistic effects and other utilities. Many are special effects, such as those that add grain and texture to an image. Others, such as the sharpening filters, are more utilitarian. Also, see optical filter.

Fisheye lens

An ultra-wide-angle lens that distorts the image in order to maximise the field of

view. On 35mm cameras, the term refers to lenses with focal lengths of around 8-15mm.

FireWire

A method of transferring data such as digital images or video between devices. FireWire 400 was first introduced by Apple in the 1990s. The most recent version is FireWire 800. A FireWire 400 cable can be connected to a FireWire 800 socket using an additional adaptor.

Fixed focal length lens

A lens that doesn't have a variable focal length, and that has a single angle of view.

Fixer

A chemical mixture used in the wet darkroom to stabilise negatives and prints after development and make them insensitive to light.

Flare

Stray, non-image-forming light that reaches the sensor, creating unwanted highlights or softening the image. Lens coatings and hoods are designed to minimise flare. However, flare can still prove a problem when shooting towards a bright light source.

Flash

A burst of artificial light used to provide all or some of the illumination for an image. Most cameras have built-in flash units, while some allow a separate flash unit to be attached via the hotshoe, or used off-camera. In studio work, large standalone flash units or strobes use mains power, and are triggered by a flash sync cable or radio signal. Flash durations are usually between 1/200 sec to 1/1000 sec and have a colour temperature of around 5,500-6,000K.

Flash synchronisation

A process that ensures that the peak output from the flash tube coincides with the shutter being fully open. On digital SLRs with focal plane shutters, full synchronisation is only possible at certain shutter speeds.

Flattening

A Photoshop term for merging all the visible layers to the background layer, reducing the file size.

Fluorescent light

The lighting produced by strip light tubes. The colour balance can vary enormously, depending on the type of tube, and manual white balance settings therefore often offer several fluorescent settings. Daylight-balanced fluorescent tubes are used in some studio lighting systems.

FO

Stands for Focus-One-touch mechanism, on Tokina lenses. It enables you to switch between autofocus and manual focus by snapping the focus ring backwards and forwards.

Focal length

Optical term describing the distance between the optical centre of a lens and its focal point. In practice, the focal length is a measure of the magnification and angle of view of a given lens or zoom setting. It's usually measured in millimetres. However, its usefulness as a way of comparing different lenses is diminished by the fact that the exact focal length required to give a particular angle of view will depend on the size of the imaging chip used by the camera in question. See EFL.

Focal plane

The flat surface upon which the image is

focused in a camera. This is the plane where the photo sites of the CCD or CMOS image sensor are positioned.

Focal plane shutter

A shutter mechanism that sits just in front of the image sensor, in the lens's focal plane. It consists of two light-tight curtains that, when using fast shutter speeds, travel across the focal plane with a thin slit between them. Light passes through this slit to expose the image sensor or film. Using shutter speeds lower than the flash sync speed, one curtain crosses the focal plane to expose the whole sensor or frame of film, followed separately by the second curtain. This type of shutter is commonly used on D-SLR cameras.

Focus peaking

An electronic visual aid in which the parts of an image in sharp focus are highlighted on a Live View screen. This function was included on Sony's NEX mirrorless cameras in 2011. It has since been introduced on other companies' new camera models, including the Leica M (typ 240) and the Olympus OM-D E-M1.

Focusing screen

The surface upon which the viewfinder image of a digital SLR is projected. Its textured surface is designed to accentuate the degree by which the image is sharp or not, thereby providing assistance when you're focusing.

4K

An ultra-high-resolution video format that delivers four times the amount of detail as 1080p full HD. It means that individual video frames, which have eight million pixels, are of a high enough quality to be printed as still images. Panasonic and Sony have both announced 4K-capable

models, and more manufacturers are due to follow suit.

Four Thirds system

A standard image sensor format introduced by Olympus and Kodak in 2002. It has a 4:3 aspect ratio (the sensor size is usually 18 x 13.5mm), while other D-SLR systems use a larger sensor with a 3:2 aspect ratio.

Format

In film photography, 'format' refers to a photographic film size and its associated camera systems. Miniature Format is 35mm or smaller, Medium Format is any film size higher than 35mm, but lower than 4x5, while Large Format is anything larger than 4x5. For file formats, see image file format.

Fox Talbot, William Henry

An inventor and pioneer of photography. Fox Talbot (1800-1877) introduced the calotype or talbotype process in 1841. His book, *The Pencil of Nature* (published in instalments from 1844-1846) was the first commercially published book to be illustrated with photographs. One of his most famous photographs, made in 1844, showed Nelson's Column in Trafalgar Square, London, still under construction.

Fps (frames per second)

Measurement of the continuous shooting rate of a camera.

Framing

A technique for highlighting a subject and giving depth to an image by using another feature within the image to form a frame around it. Examples include shooting a church tower through an archway, or a portrait of someone looking through a window frame or standing under the bough of a tree.



Fill-in flash

Flash used as a secondary light source. A fill-flash feature is an option on many cameras with a built-in flash unit. With it you can soften shadows on foreground subjects, helping to avoid problems with backlighting. Fill-in flash can also be used to enhance the colours and contrast of foreground subjects in dull lighting conditions.

Frontal lighting

Lighting directed towards the subject, and therefore positioned behind, or level, with the camera.

Full-frame

Used to describe a digital SLR sensor that has a light-sensitive area the same size as a frame of 35mm film – around 24x36mm. See sensor size.

FX

A Nikon (or Nikkor) lens that's compatible with its full-frame SLRs, as well as crop-factor ones.

G

G

Stands for Gold – a designation found on top-class Sony lenses. It's also used for current Panasonic Lumix compact system cameras and lenses.

Gain

Amplification of an electronic circuit. It's used in digital cameras and camcorders as a way of electronically boosting the sensitivity of the imaging chip in low light. See ISO.

Gamut

The range of colours that can be printed or displayed by a particular electronic device.

Gelatin emulsion

A thin coating on one side of a roll of photographic film, which contains microscopic light-sensitive silver halide particles.

Giclée

A name for digital prints made on

high-resolution large format inkjet printers, coined by the printmaker Jack Duganne in 1991. It comes from 'gicler', the French word meaning 'to spray or squirt'. The name originally referred to prints made on a prepress Iris printer, but now also includes those made on other large-format printers that use pigment-based inks and archival paper.

GIF

(graphic interchange format)

A digital file format that uses lossless compression. GIFs are sometimes used for graphics and images for use on the web. Its image palette is limited to 256 colours – much fewer than a TIFF, JPEG or raw file can contain – so its use to show photographs isn't recommended.

Gigabyte (GB)

Unit for measuring computer memory, roughly equivalent to 1,000 megabytes.

Guide Number (GN)

A number on a flash unit that measures its capacity to light a subject at a particular distance and ISO setting. Usually, based on a setting of ISO100, the guide number is determined by multiplying the flash-to-subject distance by the f-stop setting needed to correctly expose the subject at that distance. A flash with a lower guide number produces a much weaker flash than one with a higher guide number.

Grad

See graduated.

Graduated

A type of optical filter that has a dark section and a clear section. These filters – commonly known as ND grads – are used to balance the brightness in high-contrast

scenes, usually landscapes, with the dark area placed over the bright sky and the clear section over the dark foreground.

Grain

Metallic silver particles, random in shape and distribution, particularly visible in images made with black-and-white photographic film. It's present to a lesser degree in colour film. Grain is more noticeable in higher ISO film, but it's also visible in lower ISO film when making big enlargements.

Grey card

A neutral grey card, usually with 18% reflectance, is used as a standard reference when determining consistent photographic exposure. It's used by placing it in a scene to be photographed and taking a reading from it with a reflected light meter. This avoids problems of over-exposure and under-exposure.

Greyscale

A digital image in which all the colour information has been removed, leaving only black, white and shades of grey.

Grip and rip

A slang phrase for setting the camera to its highest continuous drive mode and keeping the shutter button held down to shoot as many frames as possible in a short space of time. 'Spray and pray' has the same meaning.

Ground glass screen

A sheet of glass, ground to a matte finish, which is used to look at images on large-format cameras. The image from the lens is projected upside-down on the screen. The image is examined and focused more easily by blocking out all other light with a dark cloth.

Group f/64

A group of like-minded San Francisco-based photographers, formed in 1932, which was dedicated to making clear, sharply focused images of landscapes and other natural forms. The group included Ansel Adams, Edward Weston and Imogen Cunningham. The group's name is a reference to its members' preference for using a very narrow aperture for increased depth of field.

Golden hour

Although not necessarily an hour long, this is the period of time after sunrise or before sunset in which landscape photographers particularly enjoy working because of the favourable effect of the light on their images. The main reason for the term is the warm colour of the sunlight, which, together with its reduced contrast, gives outdoor scenes an especially attractive appearance. The low angle of sunlight also creates longer shadows and reveals more texture in a landscape.

GPS

Stands for global positioning system. This geotagging feature is built into many more recently introduced camera models. Using satellite-based navigation, it records the camera's position when an image is made. This information can then be embedded in the image's metadata, allowing some software to show maps of where you took each photo.

H

Haloes

A term used to describe the glow that's created around the edges of objects when they've been over-sharpened in Photoshop or other similar photo-editing software. They are even more prevalent in high dynamic range images.

Hand tool

A tool for moving your image around when you're zoomed in and can't see all the image at once, by dragging on the image. Press the H key, or hold down the space bar, to switch to this tool quickly.

HDR (high dynamic range)

A digital imaging technique where a series of identical pictures of a scene are taken at different exposures and then combined into one image. This brings out detail in shadow and highlight areas that usually can't be captured in a single exposure, and is particularly useful for high-contrast subjects, such as brightly-lit landscapes, interiors and night scenes.

Healing Brush tool

An image-retouching tool that lays down copied pixels like the Clone Stamp tool, but in addition it analyses nearby colour and tone and attempts to blend the cloned pixels in with the surrounding area. Sometimes it produces better results than the Clone Stamp, but not always, because its blending effect will tend to blur detail. For seamless cloning, it's often a good option to use both tools.

HID

Stands for High Index Dispersion, a type of glass used in Tamron lenses that helps to minimise chromatic aberration.

High key

An image in which the bright, white tones dominate the picture.

Highlights

The brightest (whitest) areas of an image.

High speed sync (HSS)

Flash feature that allows the use of shutter



Gradient tool

Fills the image or selection with a colour that fades into another colour (or into transparency). It's particularly useful for creating masks with seamless edges, but can also be used to add colour to a drab sky.

speeds with flash, faster than the usual sync speed. The flash pulses at high frequency to ensure an even exposure, even though the shutter blinds are never fully open during the exposure. The facility is useful for freezing close-up action in daylight, and for allowing the widest apertures even in bright light.

Histogram

A graph that provides an instant guide to the contrast and exposure of a picture. It maps the distribution of tones, from the darkest on the left to the brightest on the right. The scale runs from 0 (solid black) to 255 (pure white), and the height of the graph at any point represents the relative number of pixels in the image with that brightness level. The overall shape of the histogram gives you an at-a-glance indication of the tonal range of the image and the presence of any clipping. You can use tools such as Levels to adjust the shape of the histogram and thereby improve the contrast and exposure of the image.

Hotshoe

An accessory shoe with an electrical contact, for mounting and connecting a flashgun.

HSM

Sigma's Hyper Sonic Motor is used in some of its lenses to provide faster and quieter AF operation.

Hue

Another term for colour. It tells you where a colour lies on the colour wheel without telling you how bright or dark it is.

Hyperfocal distance

The shortest distance at which a lens can be focused so that depth of field stretches

to infinity for a given aperture and focal length. When focused at the hyperfocal length, the depth of field will stretch from exactly half the hyperfocal distance to infinity.

I

Incident light meter

A hand-held light meter that measures the amount of light falling on a subject.

IF

Stands for internal focusing, and is found on many lenses from many manufacturers. The lens is constructed so that it doesn't change in length as the lens is focused. It also means that the front element doesn't rotate – which can help with the use of some lens attachments, such as petal-shaped lens hoods and polarising filters.

Image file format

A standard way of encoding information for storage in a computer file. File formats used in photography include JPEG, TIFF, PSD, DNG and GIF, all of which are suitable for particular uses. See the separate entries for those formats for details of how they differ.

Image sensor

An integrated circuit chip that converts an optical image into an electronic signal. In current digital cameras, most are either CCD (charged coupled device) or CMOS (complementary metal-oxide-semiconductor) sensors.

Infinity

Optical term to describe objects that are so far away from the lens that light from them reaches the lens as parallel rays.

In practice, it's usually used to mean objects that are on or near the horizon. Represented on lenses by the mathematical symbol, ∞ .

Instamatic

The name of a hugely popular series of low-cost, easy-to-use cameras made by Kodak. First sold in 1963, Instamatics used Kodak's cartridge-based 126 film. In 1972, the company introduced the Pocket Instamatic, which used the smaller 110 film.

Inverse square law

This law particularly relates to the use of studio lights or flash, and says that if an object is twice a particular distance from a point source of light, it will receive a quarter of the illumination. For example, if your subject is two metres away, and you increase it to four metres, the resulting fall-off means you'll need four times the amount of light to keep the same exposure settings. Alternatively, you'll have to increase the exposure by two stops.

Iris

Another name for the diaphragm, or aperture, of a lens.

IS

The abbreviation used for Image Stabilization – the optical camera shake-reduction system found in a wide range of Canon lenses.

ISO

Stands for International Organisation for Standardisation. In photography, it refers to a system for measuring and specifying the sensitivity of digital imaging systems and photographic films. The higher the ISO number, the greater the sensitivity to light. Cameras have an ISO range, enabling you to choose an ISO setting that suits the

situation in which you're shooting.
Also, see ASA.

J

Jack

A socket into which a plug is inserted to make a connection, also known as a 'female' connector. A jack on a camera is used for connecting an accessory such as headphones or a remote shutter release unit. A 3.5mm mini-jack is used for connecting an external stereo mic or to connect to old TVs.

Jaggies

See antialiasing.

Joiner

A term coined by the artist David Hockney (born 1937) to describe his photo-collage work in the 1980s. Hockney's joiners combined overlapping prints, made at slightly different times and from multiple viewpoints, to make landscapes and portraits. His most elaborate joiners used hundreds of individual prints to make one collage. Other photographers creating joiners (also called 'panographs') have followed Hockney's method of assembling prints, or have combined digital images on screen using photo-stitching software.

JPEG (Joint Photographic Experts Group)

A file format used for digital images. A variable amount of compression can be used to vary the amount of detail stored and the resulting file size. It's the standard format used by digital cameras (although raw or TIFF formats may also be options). It's a 'lossy' file format, which means it tends to degrade with each save.

K

Kelvin (K)

Unit used for measuring the colour temperature of light sources, named after the 19th century physicist and engineer William Thomson, first Lord Kelvin (1824-1907). Average noon daylight usually has a colour temperature of around 5500K.

Key light

The main light on a subject used in studio photography.

L

L

Stands for Luxury, and is used to designate Canon's best professional lenses, which have superior build quality and weatherproofing.

Lange, Dorothea

Dorothea Lange (1895-1965) was an American photojournalist and documentary photographer. Her most famous image was taken in the 1930s, when she recorded the plight of sharecroppers and migrant labourers during the Depression era for the American government's Farm Security Administration. Her best-known picture, *Migrant Mother* (1936) has come to symbolise the era.

Large format

See format.

Lasso tool

A pencil-like Photoshop tool that you can use to select an area you want to work on simply by drawing around it. It's used to make very rough selections.



Infrared photographs

Images recorded on an image sensor or photographic film that's only sensitive to infrared (IR) light, beyond the spectrum visible to us. Black-and-white IR landscapes have a 'dreamlike' quality; grass and foliage is recorded as almost white, while blue skies become black. Digital cameras can be converted to only shoot IR images by removing the IR blocker in front of the sensor in the camera body and replacing it with a filter that instead blocks visible light.

Layer

The digital counterpart of the cut-out pieces of paper in a collage or decoupage work. Layers containing cut-out objects can be stacked on top of an original image or background layer in order to create a composite image. Adjustments and effects can also be applied in the form of adjustment layers, enabling you to alter the exposure, colour, and so on, without actually altering the original. Layers can be opaque, translucent, or merged with layers in the stack below in a number of ways.

LCD

(liquid crystal display)

Type of display panel used widely on cameras to provide information to the user. High-resolution colour LCDs are capable of showing detailed images, and are used as viewing screens on digital cameras.

LD

This features on Tamron lenses that use one or more Low Dispersion lens elements to help reduce chromatic aberration.

Leaf shutter

Also known as a diaphragm shutter, it uses overlapping 'leaves' of metal, which open and close to allow light to reach the image sensor or film. It's usually located between lens elements, and is commonly found on medium- and large-format cameras.

LED

(light emitting diode)

Coloured indicator lamp used on many cameras.

Lensbaby

A selective focus lens with a flexible bellows tube section used for creating special effects. It allows the photographer to keep

part of the image in focus while the rest becomes increasingly blurred. The point of focus can be moved by pushing or pulling the lens.

Lens hood

Attaches to the front of the lens to prevent stray light from outside the image area entering the lens. The lens hood is important for preventing flare, and needs to be designed for a specific lens so as not to cause image falloff.

Levels

A tool used in digital image manipulation to adjust exposure, contrast and colour balance. Histograms are used as a guide to the corrections that need to be made to the image.

Light-field camera

Also known as a plenoptic camera, this device uses microlens-array technology to record images in a completely different way to a conventional camera. Uniquely, this allows images to be re-focused after they have been shot. The first light-field camera was introduced by Lytro in 2011.

Light meter

A device used to measure the amount of light and determine the correct exposure. Most cameras have built-in light meters that measure the reflected light from a subject, as do hand-held reflected light meters. Incident light meters measure the light falling on the subject, and readings are taken from the subject's position with the light meter pointing back towards the camera.

Light modifier

Any one of a number of devices that alters the direction and intensity of light. See reflector, softbox, snoot, and barn doors.

Light trails

Lines of light recorded in an image by a moving light source during the exposure. Examples are vehicle lights on a motorway at night, lights on a fairground Ferris wheel or someone moving a hand-held torch. They can also result from shooting images of still lights and moving the camera during the exposure.

Lomography

A photographic style originally inspired by the images produced using the low-cost Russian-made 35mm Lomo LC-A camera, introduced in the 1980s. Lomography enthusiasts include lens blur, light leaks and other camera quirks as an important part of their images. These defects are often introduced into digital photos for stylistic effect.

Long exposure

An exposure in which the camera's shutter is open for an extended time period. It may be used at night to capture movement, such as car lights on a motorway or star trails, or during daylight to blur water movement in a river running through a scene. Long exposures in daylight are usually made using a neutral density (ND) filter to prevent over-exposure.

Long-focus lens

A lens used to magnify distant subjects that has a focal length longer than the diagonal measurement of the image sensor or film being used. In 35mm terms, this is any lens with a focal length longer than the 'normal' 50mm.

Lossless compression

A process whereby the size of a digital image file is made smaller without losing information. Lossless formats include TIFF and PNG.

Lossy compression

A process in which information is lost from a digital image file to make the file size smaller. This reduces the image quality, although the result may not be noticeable. JPEG is the most common file format to use lossy compression.

Low key

An image that is dominated by dark tones.

Lytro

See light-field camera.

M

Macro

Term generally used to describe equipment for taking pictures at a closer shooting distance than usual, to provide a bigger image of the subject. Historically speaking, the term 'macro' refers to when the recorded image is life-size or larger than life-size, with a magnification ratio that is 1:1 or greater.

Maddox, Dr Richard Leach

Maddox (1816-1902) was an English photographer and doctor who invented the first successful gelatin dry plate for photography in 1871. Until then, photographers used wet plates, which had to be coated, exposed and developed in hazardous chemicals while still wet. Leach's invention made photography much less dangerous and complicated, and laid the basis for early film emulsions.

Magic Wand tool

A tool that selects pixels on the basis of their colour. Click a pixel, and more pixels of a similar colour or tone will be selected. The Tolerance setting will dictate how close in colour other pixels must be in order to be

included. A Contiguous option defines whether only adjacent pixels will be included in the selection.

Magnification ratio

The relationship between the size of the focused image and the size of the subject. If the image is life-size, the magnification ratio is 1:1.

Manual exposure

An exposure made after the photographer has selected a shutter speed and aperture of their choice, usually after taking a reading from a built-in or hand-held light meter.

Manual focus

Adjusting the camera's focus by turning the focusing ring on the lens barrel by hand. It's often used to choose a particular focus point in macro photography. It can also be essential in certain lighting situations, for example low light or mist, when autofocus can struggle to lock on to a subject.

Marching ants

The dotted lines that flicker around areas that have been selected with a Marquee tool in Photoshop.

Marquee

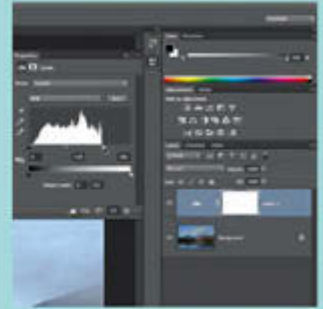
The Marquee tools enable you to make regular-shaped selections such as ellipses or rectangles. The term 'marquee' is also used to refer to the animated dotted outline that indicates the border of a selection, which is also often referred to as 'marching ants'.

Matrix metering

See evaluative metering.

Maxwell, James Clerk

James Clerk Maxwell (1831-1879) was a theoretical physicist who collaborated with



Layers panel

Formerly known as the Layers palette, this Photoshop feature enables you to manage and organise the layers in a multi-layered image, add new layers or adjustment layers, and change the way in which layers interact with each other (such as their opacity and blending mode).

photographer Thomas Sutton (1819-1875) to create the first colour photographic image in 1861. They photographed a tartan ribbon through red, green and blue filters. Then, at a lecture at The Royal Institution of Great Britain in London, the three negatives were projected together on a screen, using the same coloured filters, and combined to make one colour image.

Medium-format camera

Any camera that uses film larger than 35mm, but smaller than 4x5 (large format) film. In digital photography, the term refers to cameras that use sensors larger than a 36 x 24mm image sensor. Current examples include the Pentax 645Z and Hasselblad H5D-200c (both with a sensor size of 43.8 x 32.8mm)

Megabyte (MB)

A unit for measuring the size of computer memory and storage capacity in hard disks. Largely outmoded by the larger gigabyte unit (roughly 1,000 megabytes) as technology has improved to offer larger sizes.

Megapixel

A measurement of the resolution of a digital camera, equal to 1,000,000 pixels.

MemoryStick

Family of removable memory cards used by some digital cameras. Pioneered by Sony.

Metadata

Text information that describes an image file, such as EXIF camera settings and user-added captions.

Metered manual

An exposure mode in which shutter speed and aperture are set manually by the user, although information as to their suitability

is provided by the camera's own light-metering system.

Micro Four Thirds system

A standard for compact system cameras (CSCs) created by Olympus and Panasonic in 2008. It uses the same sensor as Four Thirds system D-SLR cameras, but doesn't use the mirror box or pentaprism. This allows a smaller, lighter and more compact body and lens design.

Midtones

All the areas of an image that aren't shadows or highlights. These are areas of brightness that, if the image were converted to black and white, would be a shade of grey rather than black or white. In a histogram, they correspond with the main central parts of the histogram graph.

Moiré pattern

In photography, moiré occurs when a detailed or repetitive pattern in the subject is overlaid with the pattern of pixels on a digital sensor. The interaction of the two patterns produces a separate, often wavy, moiré pattern. The effect is reduced by the camera's optical low pass filter.

Monochrome

Although the term applies to images made using only one colour, or shades of one colour, in photography it usually refers to black-and-white images. The 'monochrome mode' on digital cameras enables you to record directly in black and white, instead of converting colour images at the post-capture stage.

Monopod

A one-legged camera support. This doesn't provide complete stability to the camera, but enables slower shutter speeds to be used than would otherwise be possible with

a handheld camera. Used widely by sports photographers due to its manoeuvrability.

Motion blur

Out-of-focus streaking effect caused by the movement of the subject or camera during the exposure. Examples include a long exposure of a moving object passing through a static street scene at night, or panning the camera with a moving subject to create a background with blur.

Motor drive (or motorwind)

A camera facility for taking a number of pictures in rapid succession. The camera continues to take pictures as long as your finger keeps the release down, or until it runs out of memory.

Move tool

A tool used for aligning a layer by moving it around the canvas.

Mugshot

Taken from 'mug', the established slang word for 'face', the term originally applied to the stark police photographs of criminals, taken after arrest. It now refers to any simple head-and-shoulders portrait such as those found on a driving licence or passport.

Multiple exposure

An image created by two or more superimposed images.

Multizone metering

See evaluative metering.

N

Naturalistic photography

An approach put forward in the 1880s by the English photographer Peter Henry

Emerson (1856-1936). He said that photographs should be direct and simple and reflect nature. He also said they should be produced from a single negative (as opposed to the use of multiple negatives in combination printing), without being staged or retouched.

Negative

An image made on a strip or sheet of film made of transparent plastic. Tones are reversed on black-and-white negative film, while on colour negative film, colours are recorded as their complementary colours. Negatives are converted to positive images when printed on photographic paper. The first negative was recorded on paper by William Henry Fox Talbot in 1835, using his calotype process.

Neutral-density (ND) filter

An optical or electronic filter that reduces the amount of light reaching the image sensor equally across the entire field of view. It permits longer shutter speeds or wider apertures than would otherwise be possible in the lighting conditions.

NFC

Stands for near-field communication, a short range wireless technology that has been introduced on many new camera models. It enables devices to communicate by using interacting electromagnetic radio fields. Images can be transferred wirelessly between a camera and a smartphone with NFC, simply by placing the devices close together.

Niépce, Joseph Nicéphore

Niépce (1765-1833) was a French inventor who made the earliest surviving permanent image from nature in 1826. He used a camera obscura to project an image onto a pewter plate coated with light-

sensitive Bitumen of Judea. His groundbreaking 'heliograph', View from a Window at Le Gras, showed a courtyard and buildings at his house.

Noise

Unwanted interference in an electrical signal, which is seen as a grain-like pattern in dark areas of a digital image. Noise increases in digital photos when a higher ISO setting is used.

North light

The diffuse, reflected light that comes through a north-facing window, which is therefore not directly lit by sunlight. Its soft, flattering quality makes it popular in portrait photography.



OIS

Optical image stabilisation, the system used on Panasonic lenses to reduce camera shake.

OLED

Stands for organic light-emitting diode. OLED screens use a thin film of organic compound between two conductors that emits a bright light when an electric current is applied. These screens make flexible, high-quality displays that are lighter, thinner and faster to respond than LCDs. They are becoming increasingly common on high-end cameras.

1080p

A format for recording full HD video with a resolution of 1920 x 1080 pixels, offered on many current digital cameras.

Optical filter

A glass or plastic accessory placed in a



Minimalism

As with minimalism in art, music and literature, this is a style of photography that uses a small number of elements to create its effect, and is often calm and contemplative. One contemporary photographer who consistently uses a minimalist style in his landscape work is Michael Kenna.

holder or attached to the front of the camera lens. They are used to alter the image being recorded by allowing light of particular wavelengths to pass through while blocking others. Most of the traditional optical filters are only used in film photography, because their effects can be replicated by in-camera digital filters or by using post-processing techniques on a computer. The types of optical filters still used widely in digital camera capture include the polariser, UV filter, ND filter, ND grad and infrared filter.

Optical low-pass filter

A filter built into many digital cameras and located in front of the image sensor. It reduces the combined effect of moiré and false colour in digital images.

Orientation sensor

A sensor used in some cameras that detects when you turn the camera to take a vertical shot. It stores this information so that it displays the image correctly when played back on the camera LCD or computer screen.

OS

Stands for optical stabilisation, the system used on some Sigma lenses to reduce camera shake.

Over-exposure

Exposing an image for too long to suit the subject in given lighting conditions. As a result, details in highlight areas are lost or 'blown out'. Some photographers choose to over-expose when creating a particular effect. They may also use over-exposure to compensate when the camera's light meter gives an incorrect reading – when shooting snow scenes, for example.

P

Pack shot

A short form for 'packaging shot', this is a photograph of a product with labelling clearly displayed, and is usually taken for advertising or other commercial reasons. Studio setups for pack shots can vary from the simple to the elaborate.

Paint Bucket tool

A Photoshop tool that fills a complete area with a particular colour. As with the Magic Wand tool, you can adjust the Tolerance to change the effect. It can be useful for creating masks.

Painting with light

Creating images with a mobile light source. One way of painting with light is to shoot a scene in the dark, whether indoors or outdoors, with the camera on the B (bulb) setting. While the shutter is open, objects in the scene can be 'painted' with light from a hand-held flash or other light source. The other technique also involves shooting in the dark with the shutter open, but in this case the light source is moved while being pointed towards the camera, often to create a 'light trail' shape in the final image.

Palette Bin / Panel Bin

Area on the right of the interface for keeping various dialogs and information displays in Photoshop and Photoshop Elements. Later versions tend to use the term 'panel' instead of 'palette'. The feature can be minimised to buttons or hidden completely.

Pan-and-tilt head

A tripod attachment that provides independent movement of the camera in

both horizontal and vertical planes, giving the photographer greater flexibility.

Panning

Moving the camera along a horizontal plane during the exposure to follow a moving subject.

Panograph

See joiner.

Panoramic

An elongated image in which the width is at least twice the height. Panoramas are made by cropping one image, made using a specially designed panoramic camera, or by combining several images together using 'stitching software'. Aspect ratios for panoramic images can be 4:1 or higher.

Partial metering

A type of metering system where the exposure reading is taken from a small area in the centre of the field of view. It's similar to spot metering, but the reading is taken from a larger area of the image.

Passive autofocus

An autofocus system that adjusts the focus of the lens by analysing the image itself, rather than actively measuring the subject distance. Passive autofocus is used by most digital cameras, and is also known as phase-detection or contrast-detection autofocus.

Parallax

An effect in which the image seen through a camera's lens is not the same as that seen through the viewfinder, resulting in parts of the scene missing in the photograph. It's found in any camera in which the viewfinder and lens are separate, such as Leica rangefinder and twin-lens reflex cameras.

PC-E

Stands for perspective control-electronic. It's used to designate Nikon's range of tilt-shift lenses, which enable you to move the front elements on the lens to avoid or exaggerate lens distortion. These lenses are commonly used in architectural photography to ensure vertical lines remain parallel in the picture.

PC lens

Stands for perspective-control lens, another name for a shift lens.

PC socket

A simple electrical connection socket found on some D-SLRs for connecting a flash to a camera to enable synchronisation. It's widely used for connecting studio flash.

Pellicle mirror

A lightweight, thin, translucent mirror used in Sony's Single Lens Translucent (SLT) cameras. In this design, part of the light coming through the lens is diverted to an autofocus unit, and part goes to the digital sensor. This allows the photographer to see a continuous image through the viewfinder during exposure. It also avoids vibration and noise from the movement of a mirror.

Pentamirror

A low-cost alternative to the pentaprism (see next entry) used in the construction of some D-SLRs. They offer the same functionality, but use mirrors for the viewfinder construction rather than a prism.

Perspective

Perspective is used to translate a three-dimensional scene into a two-dimensional image. It gives the viewer a sense of depth in the image, for example, through the use of converging lines in a landscape. Perspective allows us to

interpret the size and distance between objects, relative to the camera's viewpoint.

Phase-detection autofocus

See passive autofocus.

Photobomb

To appear in the background of an informal portrait and upstage the person being photographed, without them being aware.

Photo book

A book largely consisting of photographs. It's a means by which photographers have displayed their work since the earliest days of the medium. Landmark photo books of the past have included Robert Frank's *The Americans* and Cartier-Bresson's *The Decisive Moment*. More recently, the ability to create a personalised photo book has come within everyone's reach via online companies such as Blurb, Snapfish and Photobox.

Photogram

A photographic image created by placing an object on a sheet of light-sensitive paper and exposing it to light. When the paper is developed, parts of the object that light rays cannot pass through are recorded as pure white, while translucent parts might be recorded as shades of grey. The technique goes back to photography's earliest days. The artist and photographer Man Ray (1890-1976) later produced many such images, which he called 'Rayographs' or 'Rayograms'.

Photojournalism

News journalism using a camera to record events. The 'golden age' of photojournalism's lasted from the 1930s to the 1950s, before television took over as the main source of news, but it still plays an important role in the media.



Pentaprism

The five-sided prism used in the eye-level viewfinder of SLR and D-SLR cameras. It ensures that the image appears the right way up and the right way around in the viewfinder, correcting the effects of the mirror and the lens.

Photomerge

A group of 'automated' features designed for combining a number of similar or related shots together, including Photomerge Panorama for combining an overlapping sequence to create a panoramic view. Elements includes additional Photomerge tools not included in Photoshop, such as Photomerge Group Shot (for combining the best features from a series of near-identical group portraits).

Photomicrography

Photographic images of things invisible to the naked eye, created using a microscope. D-SLR cameras are connected to a microscope using an adaptor, and the degree of magnification is determined by the power of the microscope.

Photoshop

Industry-standard software program produced by Adobe that enables photographers to edit digital images on screen and save them as a JPEG, TIFF, PNG or GIF. It was initially named Display, and was created by Thomas and John Knoll in 1988.

PictBridge

A system for printing directly from a camera to a compatible printer without the need for first uploading images to a computer.

Pictorialism

An artistic approach to photography, dominant during the late 19th and early 20th century. Instead of being straightforward documents of reality, photographs were given a more painterly, soft-focus appearance. Processes such as bromoil, gum bichromate and platinum printing, which involved manipulating a photograph's tones and texture using

brushes, pigments and inks, were popular among Pictorialists.

Pincushion distortion

A lens fault or aberration that causes parallel lines in an image to bow inwards towards the centre, and is seen when shooting with telephoto lenses. The effect is similar to one you'd see if an image was printed on a pincushion. It can be corrected using post-capture software such as Photoshop.

Pinhole camera

A camera that uses a small hole instead of a lens to project an inverted image on to photographic film or a digital sensor. Exposures are usually manually operated and can range from several seconds to hours in duration. D-SLRs can be converted to pinhole cameras by replacing the lens with a piece of plastic drilled with a hole of around 0.3mm in diameter. Alternative pinhole cameras have been made with anything from wheelie-bins to shoe boxes.

Pixelated

A digital image in which individual pixels can be clearly seen, either due to very low resolution or high magnification of a small part of an image. Pictures are sometimes deliberately pixelated, for example when someone's face is obscured in a newspaper for legal reasons.

Plugin

A piece of software that adds functionality to an existing computer program. Plugins are available for many digital image-manipulation programs, including Photoshop, Photoshop Elements and Lightroom, providing an increased range of effects and transformations. One such plugin is Adobe Camera Raw.

Polariser

A filter that only transmits light vibrating in one plane. It can be used to deepen the colour of part of a picture, such as the sky. It can also be used to eliminate or reduce reflections on non-metallic surfaces, such as water or glass. It must be rotated in front of the lens until you achieve the desired effect. See circular polariser.

Positive

An image that gives an accurate representation of the composition, tones and colours of the original subject being photographed, as opposed to a negative in which the subject's composition, tones and colours are reversed.

PPI

Pixels per inch. A measure of the resolution (density of pixels) in a photo print or on-screen image.

Predictive autofocus

A sophisticated autofocus setting on cameras where the focus is not only adjusted until the shutter is actually fired, but continues to be adjusted during the delay between pressing the shutter and the picture actually being taken. This enables the camera to focus more accurately on moving subjects.

Prefocusing

A manual focusing technique used for photographing moving subjects. The lens is focused on a point or at a distance, which you anticipate the subject is going to move through. The shutter is released when this point is reached.

Previsualisation

A term first introduced by pioneering photographer Ansel Adams, which he defined in his book *The Camera* (1980) as

“the ability to anticipate a finished image before making the exposure”.

Prime lens

A non-zoom lens, that is, a lens with a single and fixed focal length.

Program exposure

Any exposure mode where the camera defines both the aperture and the shutter speed.

Program shift

A program exposure mode in which the camera sets the shutter speed and aperture automatically, but the photographer has the option of altering the bias between the two readings to set a preferred shutter speed or aperture without changing the overall exposure.

PSD

Photoshop's (and Photoshop Elements') own file format, which preserves components such as layers and transparency that aren't supported by some formats (including JPEG). It's worth saving an edited photo as a PSD if you might want the option to revisit layers or adjustment layers at a later time.

Puppet Warp tool

First introduced in Photoshop CS5, this tool allows you to adjust or radically change the shape of parts of an image. Subjects can be selected and altered without affecting the background.

Push/pull processing

In film photography, push processing means increasing the film's speed by shooting with shorter exposures than recommended and increasing the development time proportionately. This allows photographers to work in lower light

conditions, but increases the grain size. Pull processing means using longer exposures than recommended and reducing development times, to give a negative with reduced contrast and grain.

PZ

Stands for power zoom, a servo-assisted zoom facility found on some Panasonic compact system camera lenses.

PZD

Stands for piezo drive, a type of ultrasonic motor used in Tamron lenses to provide fast, quiet AF.

Q

Le Querrec, Guy

Guy Le Querrec (born 1941) is a French photographer best known for his documentary work with jazz musicians. He joined Magnum Photos in 1976 and began experimenting with film shortly after. He won the Grand Prix de la Ville de Paris in 1998.

Quick-release plate

A facility for attaching and removing a camera from a tripod. A plate attaches to the camera using the traditional screw-in arrangement, then the plate slots into a recess on the tripod.

R

Rangefinder

A camera with a separate lens and viewfinder, linked by a rangefinder mechanism. When looking through the viewfinder, two separate images are shown, one of which moves when the focus ring is turned. When the two superimposed



Pixels

Every digital photograph is made up of millions of square-shaped dots called pixels (the term derives from “picture elements”). Like the tiles in a mosaic, they blend together to create a photorealistic image. Zooming into your images using the Zoom tool in Photoshop/ Elements enables you to see, and then edit, each of these building blocks if you choose.



images are perfectly aligned, the image is in focus.

Raw

A file format option provided by digital SLRs and some other top-end digital cameras. Image data is stored in a semi-processed state and needs to be fully processed on a computer. Raw files enable exposure compensation, image contrast, colour balance and other settings to be altered after the initial exposure, while still retaining maximum image quality. Raw images also offer a greater tonal range than the alternative JPEG recording quality options. Raw isn't an abbreviation, or even a single file type like JPEG; the format varies from manufacturer to manufacturer, and sometimes from camera to camera. Most current Canon models use CR2, and Nikon models use NEF.

Reciprocity

The reciprocity law states that the density of a photographic image is in direct proportion to the intensity of light (aperture setting) and the duration (shutter speed). For example, if the correct exposure for a subject is 1/125 sec at f/4 and the aperture is increased by one stop to f/2.8, the shutter speed must be correspondingly decreased by one stop to 1/60 sec to maintain the same image quality, and vice versa.

Reciprocity failure

In film photography, when shooting with very long or very short exposures, the reciprocity law (see above) can break down, leading to reciprocity failure. In these cases, extra exposure might be needed to compensate, as specified by the film manufacturer. Reciprocity failure doesn't occur with digitally captured images.

Red-eye

An effect often caused by a camera's built-in flash. The flash light reflects from the retina of a subject's eyes and gives them a bright red colour. It can be reduced or corrected in-camera, or at the post-processing stage.

Reflected light reading

The most frequently used type of exposure meter reading, which measures the amount of light reflecting from a subject. An alternative approach is to use an incident light meter, which measures the amount of light falling on a subject.

Reflector

A piece of card or other flat material that reflects and increases the amount of illumination from a light source. Reflectors can be white, silver or gold, and are often used to 'bounce' light into shadow areas and make them brighter. An umbrella-shaped reflector on a studio light is used to create softer and more diffuse illumination.

Rembrandt lighting

A studio portrait lighting technique named after the Dutch painter Rembrandt van Rijn (1606-1669), who often used it. It refers to lighting one side of the face so that it creates a triangle of light on the opposite cheek. A reflector is sometimes used to bounce light on to the side of the face in shadow.

Reportage

The act or technique of news reporting. In photography, the term refers to the art of telling a news story through pictures. Many wedding photographers offer 'reportage style' pictures. This simply means that the day's events are approached as if it were a news event, and recorded in an informal and unobtrusive way. See photojournalism.

Resize

To create a new copy of an image with a different file size or resolution (pixel count).

Resolution

A measure of the density of pixels in a printed or on-screen image, usually expressed in terms of pixels per inch (ppi). A resolution of 300ppi is widely regarded as the optimum for professional-quality printing. Monitors typically display images at between 72 and 96ppi, although this can vary with monitor size and other factors. Changing a photo's resolution in the Image Size dialog in Photoshop won't change how big it looks on-screen, only in print.

RF

The rear focus feature is found on super telephoto lenses. With rear focus, the group of elements nearest the camera are used to determine the point of focus, providing faster autofocus.

RGB

Stands for red, green and blue. These are the three primary colours used by a digital camera to record a picture. Some tools can access and edit each of the three colour channels separately.

Rim lighting

Light from behind or to the side of a subject that gives a thin line of light around some or all of the subject's edge, which sets it clearly apart from the background.

Ring flash

A flash lighting system that uses a circular flash tube attached to the front of the lens to provide even, shadowless lighting. Ring flash is often used in macro photography, but is sometimes used in other kinds of photography including portraiture. Oversized ring flashes are available for

studio use, providing doughnut-shaped catch lights when used for portraits.

Rule of thirds

One of the best-known compositional 'rules', in which an image is divided, horizontally and vertically, into three parts, using two equally spaced lines. Important elements of the picture are then placed on one or more of these lines, which creates a stronger and more visually appealing composition than simply centering the subject. The term has its origins in painting, and was first written down by the artist John Thomas Smith in 1797.

Roll film

A photographic film wound on a spool and protected from light with paper backing. The most commonly used type is 120 roll film. It's used in cameras shooting 6x4.5, 6x6, 6x7 and 6x9 negative sizes, plus panoramic cameras.

S

Sabattier effect

A wet darkroom effect in which an image is processed so that it's partly a normal positive image and partly a negative. It was first described in the 1860s, but became well-known in the work of Man Ray (1890-1976). His assistant, Lee Miller (1907-1977) accidentally turned on a light while developing a print, but Ray liked the effect and consciously used it in his work. He called it 'solarisation'. The Sabattier effect is easily recreated using Photoshop, and looks best applied to a black-and-white image.

Safelight

A red/orange lamp used to light a traditional wet darkroom when printing black-and-white photographs. It's safe to use

at the printing stage because photographic paper isn't sensitive to red/orange light.

SAM

Stands for smooth autofocus motor, which has been used in recent Sony Alpha lenses.

Saturation

The strength of a colour or hue. An increase in saturation gives a more intense colour. Too much saturation, and the image will look unreal. An image with no saturation whatsoever will be black and white.

Scale

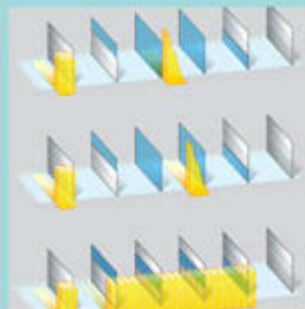
Scale gives us a sense of the size of an object or environment in an image, by using another object in the scene as a frame of reference. For example, by including a person in a landscape, the viewer is given a strong idea of the relative size of that landscape.

Scheimpflug principle

Theodor Scheimpflug (1865-1911) stated: "If the lens plane is tilted down, when the extended lines from the lens plane, the object plane and the film plane intersect at the same point, the entire subject plane is in focus." This principle comes into play when using tilt-shift lenses or tilt-and-swing movements on view cameras. In practice, it means that if you're photographing a landscape, the lens can be tilted forwards until the plane of focus runs parallel to the ground. As a result, depth of field is vastly increased, even when shooting with the lens wide open.

Scratch disk

Hard disk space used by Photoshop while processing an image to temporarily store information and make the process faster. It's used, for example, to store the history states that are essential for using the History panel.



Rear-curtain sync

Flash feature found on some D-SLRs and flashguns that synchronises the flash output when the second shutter curtain is about to close. Usually, the flash fires at the point where the first shutter is fully open. The facility gives more natural-looking images when using flash in conjunction with slow shutter speeds.

Screen grab

Also called a screen shot or screen capture, this is an image of all or part of a computer monitor display that can be saved as a graphics file.

SD

Super-low dispersion, the glass used in Tokina lenses to reduce chromatic aberration.

SD (Secure Digital) card

A type of removable memory card used in some digital cameras.

SDHC**(Secure Digital High Capacity)**

A type of SD card that has a higher maximum capacity than standard SD cards (up to 32GB).

SDM

Supersonic drive motor, Pentax's fast, quiet focus motor.

SDXC (Secure Digital Extended Capacity)

A type of SD card that has an even higher maximum capacity than SDHC cards (up to 2TB).

Second curtain sync

An alternative term for rear-curtain sync.

Secondary mirror

A mirror used in digital SLRs to project some of the light passing through the lens to exposure and autofocus sensors.

Selenium tone

A chemical treatment applied to a silver-based black-and-white print in a wet darkroom that changes some of the metallic silver to silver selenide. Depending on dilution and the type of printing paper,

tones may range from red-brown to purple-brown. The appearance of the effect can now be simulated in post-capture software on a computer. Photoshop CS6 and CC includes selenium toning among its range of toning presets.

Selfie

A modern term for self-portrait, a genre becoming increasingly popular in the age of the smartphone camera.

Self-timer

A camera facility that incorporates a delay between the pressing of the trigger and the beginning of the exposure. It has traditionally been used to enable the photographer to appear in the shot. It can also be used as a way of minimising the vibration caused by pressing the camera shutter, when shooting a long exposure with the camera mounted on a monopod or tripod.

Sensor size

The dimensions of the CCD or CMOS sensor in a digital camera vary greatly according to the type of camera. This has a major impact on image quality. Larger sensors collect more light and produce images with greater dynamic range and less noise than smaller sensors. Smartphone camera sensors measure around 4.5 x 3.4mm; compact camera sensors are around 6.1 x 4.5mm; D-SLR sensors are around 23.5 x 15.6mm, while a 'full frame' 35mm sensor measures around 36 x 24mm. A medium-format sensor (such as in the Pentax 645Z) measures around 44 x 33mm.

Sepia tone

A chemical treatment used in traditional photography that converts metallic silver in a black-and-white photograph to silver

sulphide. It has the effect of changing shades of grey into shades of reddish-brown. The appearance can easily be created in digital images, either in-camera or using Photoshop.

720p

A high-definition video recording format with a resolution of 1,280 x 720 pixels, offered on many of the more recent digital cameras.

Sharpening

Sharpening boosts the contrast around the edges of objects to increase definition, which helps counter the inherent softening effect of digital capture. Inkjet printing has a further softening effect, so if you're going to print your image, it will need more sharpening than it would need for on-screen viewing. Over-sharpening can be a problem, leading to undesirable haloes.

Sheet film

Film used in large-format cameras, including 5x4 and 10x8 equipment, which is supplied in boxes of individual sheets.

Shutter

A device for allowing light to pass through a camera lens to the digital sensor or film, usually for a precise period of time. See also leaf shutter and focal plane shutter.

Shutter lag

The delay between the photographer physically pressing the shutter and the exposure actually being made.

Shutter priority

A semi-automatic exposure mode in which the shutter speed is set by the photographer. The aperture is then set by the camera to suit the metered light readings taken by the camera.

Shutter speed

Also called exposure time, this is the length of time the camera's shutter is open to allow light coming through the lens to reach the image sensor or film.

Side lighting

This is illuminating a subject from one side across the camera axis, either using natural or artificial light, while the other side remains in shadow. It's often used in portraiture to give texture and depth to a subject. It can give a dramatic look, especially against a dark background. If desired, shadow areas can be lightened by using a reflector.

Silver halide

The light-sensitive chemical compound that, when coated on photographic film or paper, enables images to be recorded.

Single lens reflex (SLR)

A camera that uses a pentaprism and mirror to show the exact image being seen through the lens. When the shutter is released, the mirror flips up to allow the image to pass through to the sensor or film.

Slave

Device that triggers a flash unit automatically when another flash is fired. The slave uses a light-sensitive photoelectric cell, and cuts down on the number of cables needed in a studio.

SLD

Stands for super-low dispersion – lens elements in Sigma lenses that reduce chromatic aberration.

Slow lens

A lens with a narrower than average maximum aperture for the focal length. As a result, shutter speeds at the

maximum aperture are longer than with 'faster' lenses.

Slow sync flash

Technique in which a slow shutter speed is used in conjunction with flash. The flash usually provides the main source of illumination, but the ambient light creates a secondary exposure that can be useful in suggesting movement, or for providing detail in a background that would otherwise have looked unnaturally dark.

SLT

Stands for Single Lens Translucent. This is a proprietary name for Sony Alpha cameras that use a pellicle (fixed, translucent) mirror, electronic viewfinder and phase-detection autofocus system.

Smc

Stands for super multi coating, a seven-layer coating used on Pentax lenses to reduce light reflected by the lens itself.

Snapshot aesthetic

A style of fine-art photography that uses a seemingly casual, snapshot appearance, and focuses on everyday subject matter. Photographers using this approach have included William Eggleston (born 1939), Nan Goldin (born 1953) and Wolfgang Tillmans (born 1968). It was particularly popular in 1990s fashion photography.

Snoot

A tube-like attachment in the shape of a cone or cylinder, which fits on the front of a flash unit or studio light. It enables the photographer to control the direction and width of the light so that it concentrates on, or isolates, a subject.

Social documentary

Photographic genre that concentrates on



Shift lens

An interchangeable lens available for a small number of D-SLRs and medium-format cameras. The lens provides a limited range of camera movements, including a facility for the lens to be shifted upwards to avoid converging verticals when photographing tall subjects, especially buildings. Also known as a PC lens.

recording the everyday lives of people from different nationalities, cultures and social classes. Social documentary projects often have a particular purpose, such as the photographs of Lewis Hine (1874-1940) highlighting child labour in the early part of the 20th century, or Sebastião Salgado's 1993 project on the conditions endured by workers in different countries around the world.

Softbox

An enclosure around a flash or continuous light. The insides are lined with reflective material while the square or round front screen is made of a white opaque material that diffuses and softens the light. Softboxes can measure anything from 40cm to 2m across the front, and are often used instead of umbrellas for diffusing harsh flash light.

Soft focus

Slightly blurred and lacking in sharp definition. Images can be 'soft' due to a lens flaw, or made deliberately so to give a romantic 'glow' to an image. It can be achieved in-camera by attaching a soft-focus or diffuser filter to the lens, or by shooting through a piece of translucent material (for example, a section cut out from a pair of tights). It can also easily be added using post-capture software on a computer.

Solarisation

See Sabattier effect.

Sontag, Susan

Susan Sontag (1933-2004) was an American writer, filmmaker and prominent activist, whose series of essays collected in the book, *On Photography* (1977), was a groundbreaking critique of the photographic medium.

Soup

Slang term for developer.

SP

Stands for super performance, a long-standing tag found on top-of-the-range Tamron lenses.

Spot meter

Exposure metering system in which a meter reading is taken from a very small area in the centre of the frame.

sRGB

RGB colour space frequently used by digital cameras, but providing a narrower range of colours, or 'gamut', than the Adobe RGB space.

SSM

Stands for supersonic motor, used for high-speed autofocus in top-of-the-range Sony lenses.

Standard lens

A focal length of lens roughly equal to the diagonal of the image sensor area. Typically, standard lenses have an effective focal length of around 50mm.

Steichen, Edward

Edward Steichen (1879-1973) was an American fashion and portrait photographer. As Chief Photographer at Condé Nast publications in the 1920s and 1930s, he was the most famous (and reputedly the highest paid) photographer in the world. He was Director of Photography at the Museum of Modern Art in New York from 1947-1962 and in 1955 organised the Family of Man exhibition, seen by over nine million people.

Still-life photography

Following in the centuries-old tradition

of still-life painting, still-life photographs focus on single or small groups of objects. They can be shot indoors or outdoors, using daylight or artificial light, and are usually carefully arranged by the photographer. Notable still-life photographers include Edward Weston (1886-1958) and Irving Penn (1917-2009).

Street photography

Photographs taken in public places that record human behaviour or interaction in a way that comments on society or life in general. Street photographers aim to capture life as it happens and usually take pictures when people are unaware. Those who have worked in this broad genre include Henri Cartier-Bresson (1908-2004), Robert Frank (born 1924) and Garry Winogrand (1928-1884).

Stieglitz, Alfred

An important advocate for photography as an artistic medium, Stieglitz (1864-1946) formed the Camera Club of New York in 1896 and edited the magazine *Camera Notes*. He formed the Photo-Secession in 1902, a group of leading photographers that argued that artistic expression was the most important thing about photography. His ideas influenced a generation of photographers.

Stitching

Combining two or more overlapping images of a subject to create one seamless panoramic or high-resolution image. It can be achieved via dedicated software programs such as Autostitch or Canon's Photostitch, or using the Photomerge feature in Photoshop.

Stop

A unit of exposure. Changing exposure by a single stop is equivalent to doubling or

halving the amount of light reaching the image sensor. The distance between each of the standard aperture settings (f/2.8, f/4, f/5.6, f/8, f/16 etc.) is a full stop. Digital SLRs usually provide a number of intermediate half-stop or third-stop settings. Also, see f/X.X.

Stop down

Close down the camera's aperture. The opposite term is 'open up'.

Strobe light

Also called a stroboscopic lamp, this light source produces flashes of light (usually around 200 microseconds in length) at regular intervals. In photography, it's been used to make high-speed images of subjects that move too fast for the eye to see, such as a bullet zipping through the air. Strobe lights have also been used to capture multiple images of a moving subject in one image, for example in the photographs of dancers by Gjon Mili (1904-1984).

Superzoom

A lens with an unusually large focal length range. Current superzoom examples available for D-SLR cameras include the Tamron 80-270mm f/3.5-6.3 and the Sigma 18-200mm f/3.5-6.3. Some of the largest superzooms are found on bridge cameras; the Panasonic Lumix DMC-FZ70 has a 60x optical zoom, for example, which is equivalent to 20-1,200mm. Bridge cameras themselves are sometimes called 'superzooms' or 'ultrazooms'. See bridge camera.

Swinger, Polaroid

A name used on some of the affordable and easy-to-use range of instant cameras produced by the Polaroid Corporation in the 1960s and 1970s.

SWM

Silent wave motor, the high-speed quiet autofocus motor used on Nikon's AF-S lenses.

Sync speed

The fastest shutter speed that can be set on a camera that enables synchronisation with the flash. See flash synchronisation.

T

Table-top photography

Images of small objects or a miniature scene, arranged on a table top.

Talbotype

See calotype.

Teleconverter

A supplementary lens used between a primary lens and the camera body to increase the focal length range of the primary lens. For example, a 1.4 teleconverter on a 200mm lens will increase the focal length to 280mm, but causes a corresponding reduction in the maximum aperture size.

Terabyte (TB)

Unit for measuring computer memory or disk storage capacity, which is roughly equivalent to 1,000 gigabytes.

TFT (thin film transistor)

High-quality colour LCD technology, widely used for rear displays on digital cameras.

Thumbnail

A small, low-resolution version of a larger image. It's often used in image management applications such as Adobe Bridge and Organizer to make it easier and faster to search through and preview your photo



Telephoto

A term generally used to describe any long-focus lens (in 35mm photography, a lens with a focal length of 85mm upwards). However, telephoto technically refers to a long-focus lens in which the physical length of the lens is shorter than its focal length, a design feat achieved by its internal lens assembly.

collection. The small representations of each layer in the Layers panel in Photoshop and similar software are also referred to as thumbnails.

Three-quarters lighting

Used in portraiture, this style of lighting is created by placing a light at approximately 45 degrees from each side of the centre line of the face. It lights three quarters of the face, leaving a shadow area along the side opposite to the light that gives the face depth and volume.

TIFF (Tagged Image File Format)

Digital image format used to record files with maximum available detail. Files can be large, although this can be reduced using lossless compression.

Time exposure

See long exposure.

Time-lapse

Technique where pictures are taken of the same subject at regular intervals, then combined into moving video footage. Some time-lapse photographers record an event that takes place over a long period of time, such as a butterfly emerging from a chrysalis or a flower opening its petals.

TLR

Stands for twin-lens reflex. A TLR camera has two lenses of the same focal length; one is used for taking the picture while the other provides the image for the waist-level viewfinder, seen via a 45-degree mirror. The two lenses are connected so that focusing is the same on both lenses.

Tog

Short form for 'photographer'.

Toy camera

An inexpensive and easy-to-use film camera, such as the Holga, Lubitel, Lomo LC-A and Diana. Their lens quality and general build leads to vignetting, image blur, distortion and light leaks, but many photographers enjoy incorporating these flaws into their images for artistic effect.

Tone mapping

A technique used in image processing to reduce the range of tonal values in a high dynamic range image, so it looks more natural when shown on a computer monitor or in print.

Toning

Changing the colour of a black-and-white print or digital image. In traditional photography, black-and-white prints are usually toned using chemicals to change the metallic silver in the print emulsion to a silver compound. This happens in sepia and selenium toning. Other processes, such as platinum and gold toning, are known as metal-replacement toners. Similar effects can be produced in digital images using post-processing techniques.

Transform

A Photoshop tool used to scale, rotate, reduce, enlarge, distort or change the perspective of a layer, selection or shape.

Travel photography

A genre of photography that concentrates on documenting the landscape, people, culture and customs of a country.

Tripod

A three-legged camera support.

Tripod bush

Threaded socket found on the base

of cameras, used for attaching tripods and other accessories.

TS-E

Tilt-shift electronic – Canon's range of perspective control lenses. (See PC-E.)

TTL (through the lens) metering

An exposure metering system in which the intensity of light is measured through the camera lens.

Tungsten lighting

A type of bulb lighting that has a warm colour temperature of between 2,600 and 3,500K.

Tv (time value)

Abbreviation used for shutter priority on some cameras.

U

UD

Stands for ultra-low dispersion, a type of glass used in Canon lenses to reduce chromatic aberration in the image.

Umbrella

An umbrella is used in a studio to reflect and diffuse light from a flash unit, creating a softer and more even light. The most common types are the white shoot-through umbrella, which is used between the flash and the subject, or the black umbrella with a reflective silver or white underside that bounces flash light back on to the subject.

Under-exposure

An insufficient exposure for the subject to retain all the shadow details, so that darker areas become black or almost black.

The greater the under-exposure, the darker the image. This may be a conscious choice for artistic reasons.

Underwater housing / waterproof housing

A sealed container specifically made to protect particular cameras from damage in underwater photography, and that allow controls to be accessed and operated as normal.

Unsharp Mask

One of the most popular Photoshop tools for increasing sharpness in a digital image. It gets its curious name from a traditional print process, where a soft focus negative is sandwiched with the sharp original in order to increase edge contrast.

USB 3.0

The third version of the Universal Serial Bus standard for connection and communication between computer peripherals (including digital cameras and printers) and personal computers. It was released in 2008 and was further updated to USB 3.1 in 2013.

USD

Stands for ultrasonic silent drive, Tamron's fast, quiet AF motor.

USM

Stands for ultrasonic motor, a fast, low-noise autofocus motor used by some Canon lenses.

V

Variable contrast

A type of photographic printing paper that, in the wet darkroom, allows a range of contrast grades to be produced by

changing the colour of the filter in the enlarger head.

VC

Stands for vibration compensation, the name of the optical camera shake-reduction system fitted on some Tamron lenses.

Vibrance

A slider available in Adobe Camera Raw and Photoshop that enables you to increase the saturation of colours. It doesn't increase saturation universally – it concentrates on colours that are not saturated already, with a more limited effect on colours that are already intense. This often leads to a more visually pleasing result.

View camera

A large-format film camera that uses sheet film. Depending on the camera design, film sizes can range from 5x4 inches to 20x24 inches. All view cameras have a front standard with a lens mount and a rear standard with a film holder and ground glass screen for focusing. Both standards can be moved backwards and forwards and at different angles to alter perspective, focus and depth of field. They are connected by a flexible and extendable bellows. View cameras can be used with digital backs instead of film.

Vignetting

Darkening of the corners of an image. This appearance is often deliberately created to highlight a subject in the centre of the image, and can be applied by digitally burning in corners in Photoshop. It's also commonly seen in images taken with toy cameras such as the Holga. If vignetting is unintended, it's usually due to lens fall-off, and can be corrected using post-processing software.



UV filter

An optical filter that absorbs ultraviolet (UV) radiation. It can be used to improve visibility and quality in mountain and maritime landscapes. Many use them to protect the front of the lens.

VR

Stands for vibration reduction, Nikon's name for its image-stabilisation system.

W**WB**

An abbreviation for white balance. See white balance.

Watermark

An element embedded in a digital image, such as the photographer's name or a symbol, to show ownership and prevent images being used without the copyright owner's permission.

Weston, Edward

Edward Weston (1886-1958) was one of the major American fine-art photographers of the 20th century. His aim was, he said, to "make the commonplace unusual." His photographs were clear and detailed representations of landscapes, portraits, nudes, and, most famously, still-life subjects such as seashells and peppers.

White balance

Digital camera system that sets the colour temperature for the scene being photographed. This can be set automatically, with the system attempting to set the colour so that it looks normal to the human eye. Most D-SLRs also offer a wide selection of manual white balance settings – where the WB can be set from a reference source (such as a piece of white card), or to a particular Kelvin value, or to a lighting type (such as sunny daylight or tungsten bulb lighting).

Wide-angle lens

A lens with a focal length shorter than the

'normal' lens (that is, the lens that gives the most true-to-life field of view) for a given format. In the 35mm format, focal lengths from 35mm to 24mm are considered wide-angle, while lenses from 21mm to 14mm are generally described as ultra wide-angle.

WR

Weather resistant – a term found on certain Pentax lenses.

Wratten number

A code for labelling optical filters, named after the inventor Frederick Wratten (1840-1926). Each separate colour has a number (orange filters, for example, have the number 81) and some have letters to indicate the strength of the filter (an 81EF is much stronger than an 81A, for example).

X**XLD**

Stands for extra low dispersion, the glass used in some Tamron lenses to reduce chromatic aberration.

XMP

Stands for extensible metadata platform. A labelling technology used by a number of image-editing programs, including the Photoshop family. It records information about a file, and is usually embedded within the file itself. With raw files, the XMP information is recorded separately.

XR

Stands for extra refractive, a type of glass used in Tamron lenses. It can bend light at wider angles than normal glass, helping to make the overall size of the lens smaller.

Y**Yellow filter**

In film photography, yellow filters were often used by black-and-white landscape photographers to darken a blue sky and brighten the landscape.

Yevonde, Madame

Madame Yevonde (1893-1975) popularised the use of colour in portrait photography in the early 1930s. She's most famous for her studio portraits of the mid-1930s that made creative use of costumes and props.

Z**ZA**

Stands for Zeiss Alpha – a range of Sony lenses designed by Carl Zeiss.

Zone system

The Zone system is a systematic technique for calculating the best possible film exposure and development. It was formulated in around 1940 by photographers Ansel Adams (1902-84) and Fred Archer (1889-1963).

Zoom

A lens with a variable angle of view. On a zoom lens, the focal length can be changed while the focus remains the same. Typical zoom lenses have focal lengths between 17mm and 80mm.

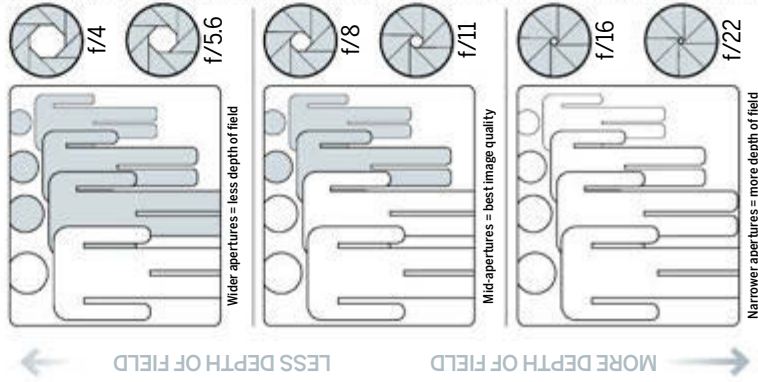
Zoom ratio

The relationship between the shortest and longest focal length setting of a zoom lens. For example, a 14-42mm lens has a zoom ratio of 3:1, or 3x; a 50-500mm lens has a zoom ratio of 10:1, or 10x.

CAMERA BAG ESSENTIALS

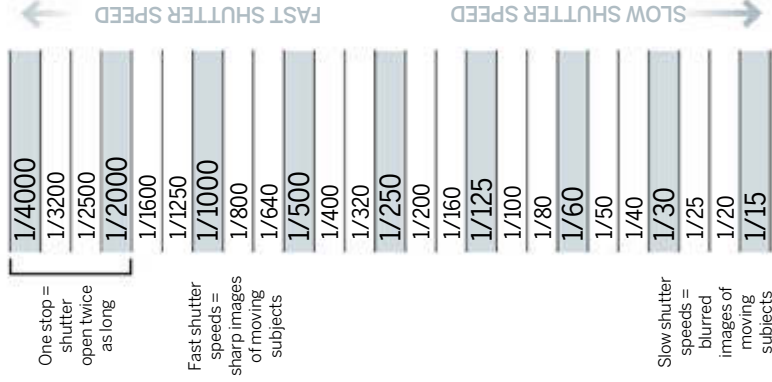
DEPTH OF FIELD EXPLAINED

The aperture you use is the main factor in dictating how much of the scene appears sharp. The narrower the aperture opening (and the larger the f-stop number) the more of the image will be in focus



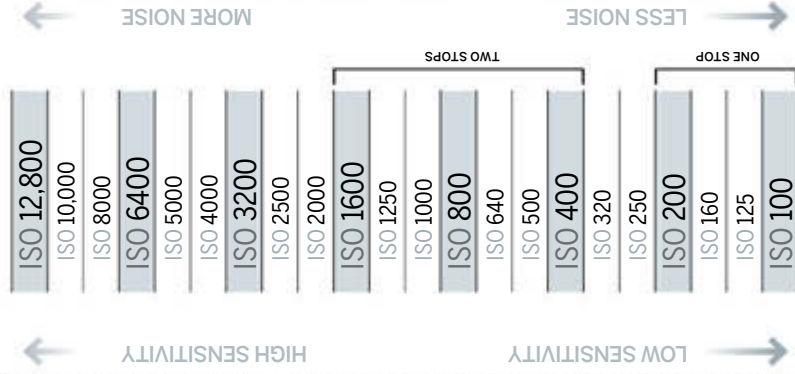
THE SPEED SCALE EXPLAINED

Just like aperture settings and ISOs, shutter speeds go in a fixed sequence, although sometimes intermediate values are used too



UNDERSTANDING THE ISO SCALE

ISO settings go up in fixed values, with intermediate settings available too. High ISOs can be useful in low light, although the 'noise' in the image increases



WIDE-ANGLE TO TELEPHOTO

The focal length of a lens and its angle of view go hand in hand. Wide-angle lenses have shorter focal lengths, while telephoto lenses have long focal lengths. The effective focal length, or EFL, is also given for APS-C sized sensor SLRs

